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ABSTRACT

Q-type factor analysis was used to re-analyze baseline data collected in 1957, on 47 men aged 65-91. Q-type analysis is the use of factor methods to study persons rather than tests. Although 550 variables were originally studied involving psychiatry, medicine, cerebral metabolism and chemistry, personality, audiometry, dichotic and diotic memory, and social psychology--this report focuses on those Q factors which contain information on Wechsler Adult Intelligence Scale scores and various biological indices. The factors which were found to provide meaningful descriptions of these 47 subjects include: (1) full scale intelligence quotient; (2) lack of insight, as rated by psychiatrists; (3) blood pressure; (4) memory; (5) pulse rate; (6) hearing ability; (7) blood chemistry of the brain; (8) blood oxygen content; (9) blood glucose; (10) hemoglobin concentration; (11) history of angina pectoris; (12) social initiative; (13) oxygen-glucose ratio; and (14) electrocardiogram rating. (The usefulness of Q-type factor analysis is compared to R-type factor analysis, and extensive data tables are included.) (GDC)

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Q-TYPE FACTOR ANALYSIS OF HEALTHY AGED MEN

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The NIMH has financed a long-term study of a small group of healthy aged men. These investigators started in 1957 and subsequent abridged follow-up studies were repeated in 1962 and 1968. A major report was prepared on the baseline 1957 clinical investigations (Birren, Butler, Greenhouse, Sokoloff, and Yarrow, 1963), and a longitudinal appraisal of the survivors was presented for the period 1957 through 1968 (Granick and Patterson, 1971). Despite the extensive amount of publications which resulted from these clinical investigations, the data from these numerous studies have not been completely analyzed. Granick and Kleban (1978) have transferred these data sets to computer tapes which can be purchased for a minimal charge for those professionals who want them.

In the 1957 studies, each investigator (or team of investigators) separately analyzed their data. The descriptions of methodology and results are contained within the text (Birren, et al., 1963). These investigators were aware indeed of the nadir of interdisciplinary analyses, but with an N=47, such an undertaking would have serious limitations from the standpoint of traditional nomothetic procedures. The mighty statistical integrator, that is, R-type factor analysis, would be badly constrained by the immense disproportion in variables to Ss. Nevertheless, cross-discipline investigations were undertaken (Birren, et al., 1963) with the major emphasis being a dichotomy of Ss on the basis of health vs. asymptomatic illness, a theme which also appeared recurrently throughout the individual clinical investigations. The latter is indeed a significant gerontological focus, but for this particular

sample of Ss it turned out to be a relatively undramatic division as compared to other comparisons, such as brightness vs. dullness in intelligence, degree of hearing loss, and presence of incipient senile developments in this rather healthy group of aged men.

The present paper is a partial report of a statistical investigation of the 1957 baseline studies which focused on cross-discipline observations. A Q-type factor analysis was used to provide such an integration. The proportion of variables (=550) to SS (=47) was more than sufficient statistically and these clinical research investigations (i.e., types of scientific and clinical measurements) were literally among the best that contemporary gerontological science is capable of producing. It was indeed a magnum opus which was produced under the guidance of renown scientists.

Unfortunately, there has been very little interest among researchers both for Q-type factor analysis as a technique and for viewing these gerontological data from the vantage of a Q-analysis. There are several possible reasons for such disinterest.

First, the author must take some responsibility for difficulties encountered when trying to communicate these findings. The initial reports were lengthy, cumbersome, and loaded with complicated tables. The present reports, come to think of it, have the same characteristics, but now the author has a greater command and understanding of the Q-technique. This should improve, hopefully, the quality and clarity of the communication. The author's initial attempts at describing the Q output rested too heavily upon R-type

models, resulting in considerable confusion about the meaning of the Q-factors.

Second, other researchers, many of whom are quite adept and artful with R-type factor analysis, also have the same types of prejudices as the author, imposed by training and experience with the R-technique, which makes it difficult for them to understand and be objective with respect to the Q-technique. It can be frustrating to try and comprehend the workings of a Q-analysis when viewing it from R-technique paradigms.

Third, Q-type factor analysis has a tainted past. Stephenson was its great advocate in the 1930's. He came under serious criticism by emminent factor analysts, such as Burt (1973) and Cattell (1952). Subsequent counter-arguments by Ross (1963) and Broverman (1961) should have placed Q-type factor analysis in a respectable position, and should have returned it to the portfolio of usable scientific methods. The criticisms of Cattell and Burt did not hold up under scrutiny, but in the minds of many researchers, the criticisms are as current today as they were when made back in the 1930's. Although traditional attitudes tend to perseverate, there have been interesting current applications of the Q-technique suggesting that some researchers still judge a technique by its merits and not its reputation (Borkovec, 1976).

Procedure: Q-technique as used with these NIMH Ss:

The data matrix contained 47 male aged Ss (mean age = 71., Range, 65-91) and 550 variables. The variables were from the following clinical domains: psychiatry, medicine, cerebral metabolism and chemistry, psychometrics, personality measurements and tests (TAT

Rorschach, MMPI), audiometry, dichotic and diotic memory, and social psychology.

The Ss by variable matrix was first standardized across subjects so that each variable had a mean of zero and a sigma of 1. A 47 x 47 subject R-matrix was then calculated, which, in the process, of course, produced a double-centered R-matrix. The result were correlations among Ss which expressed the similarity-dissimilarity of profile patterns across variables. Since only deviations from each S's mean of zero were being compared, it was possible for high correlations to exist between Ss because of profile deviation similarities when absolute scores might have had maximal differences. This statement would be sufficient for Cronbach and Gleser (1953) to reject Q-analysis as a basis of analysis; they would purport the superiority of distance measures, the prototype being the Mehalenobis D-square.

As far as the author is concerned, each approach provides unique information. Profile patterns can be of importance under some circumstances, and distance measures likewise can have their areas of propitious application. Distance measures are not immune from difficulties, for it is possible for two Ss to have the same D-square scores based upon distinctly different profiles. The issues of distance vs. profile measurements can be quite complex, and most behavioral domains are insufficiently developed scientifically to even consider entertaining blanket statements about the best models for observing them. Until theoretics or empirical relationships within domains become clearer, it might be more worthwhile to observe phenomena from varied standpoints. This diversity would probably sober us to the fact that we make observations through the constraints

imposed by complex statistical procedures.

After producing the 47 x 47 R-matrix of Ss, any standard factor analysis package (e.g., SPSS, BMD) can be employed. Sixteen eigenvalues were selected as an approximation of the common factor space. Both the Kaiser 1.0 and Scree graph criteria were in agreement on 16 eigenvalues. Each researcher must decide whether to use principal components or factors, and whether or not to rotate (and by what procedure: orthogonal, oblique, or hand rotation). In this study, the author never really moved beyond the principal Q-factor stage, because it became the battleground for working out methodological problems. The author struggled with redundant statistical operations until clarity emerged about the meaning of the Q's. At that point, it was too late to consider the issue of rotation.

The first output from the SPSS program was a principal Q-factor matrix. It looked so simple and so clear. After the first glance and a study of the literature on taxonomy using Q-factors, the author realized that the factor output was seductively misleading. One can not really trust the Q-factor classification of Ss.

In order to explore the dimensions underlying the Q-factor loadings, the correlation of each Q-factor with all the variables provided a 550 variable by 16 Q-factor matrix of correlations (Table 1). The significant correlations indicated which variables were related to each Q.

This 550 by 16 correlation matrix provided information about the processes contributing to the loadings of Ss within the Q-factor matrix. After making mistakes trying to interpret Q-factors

as a facsimile of R-type factors, it became apparent that a different procedure was required.

The 550 by 16 correlation matrix generated a series of clinical patterns or pictures which could strain the knowledge and experience of well-trained scientists and clinicans. The first principal Q-factor was rather easy to interpret. Much of its content is contained within academic courses and textbooks in gerontology. The other Q-factors appeared to be depicting less frequently observed clinical constellations. Experienced clinicans, however, would probably be more adept than I in describing them.

Interpretation of these clinical patterns even by experienced professionals from the 550 by 16 correlation matrix could be a very tricky problem, one beset with much guesswork and speculation. It turns out that each of these Q's contains within several independent sources of influence. A stepwise regression of each Q on the variables, for example, identified approximately 10 independent sources of variance within each Q. The first Q, for example, has 220 significantly correlated variables. The principal Q-factor matrix generated by the computer program was primarily the result of the major, dominant influences in each factor, If these first dominant influences were partialled out, then one would have a new principal Q-factor matrix with a completely different arrangement of Ss having the highest vs. lowest loadings. Each time the process is repeated a new set of Ss emerge into prominence in the factor loading matrix. These weightings can be used to form related clusters of variables, that is clusters which are more amenable to clinical descriptions in which the conjecture attending the 550 by 16 correlation matrix has been obviated by the stepwise procedure.

With the Q-factors regressed upon the variables, one can now describe the clinical domains. But the price is another type of methodological concern. The stepwise procedure of residual orthogonalizations was the most convenient way, though perhaps not the best way, of observing how the independent influences coalesced within a Q-factor. The Q's are definitely not organized around any single type of content. The author has some intuitive ideas on how the factors are produced based on the present statistical work. The first dominant influence of a Q-factor links a set of variables together; common secondary sources of variance in the residuals of these variables combine to produce secondary influences. These secondary influences draw other variables into the Q-factor. Some of the new variables enter with considerable strength. The process is repeated across all the Q-s and as a result the composition of influences within Q-factors can be quite capricious. The stepwise regression sorts and differentiates these primary, secondary, and tertiary influences. This hodge-podge of linked influences within Q's is found in both unrotated and rotated solutions (Kleban, 1977). It is a hodge-podge which requires considerable statistical tracing in order to identify the internally consistent parts (i.e., the variates that correlate or cluster together).

Q-factor 1 literally comes the closest to having a single source of influence, that is, an internally consistent structure. The dominant influence was WAIS Full Scale IQ (table 3) and it has an $r = -.84$ with Q1, containing 71% of the Q1's variance. Of course, full scale IQ had shared variance with many of the 220 variables

which significantly correlated with Q1. But notice that even on Q1, the second entering variable of the stepwise regression (table 4), right ear conductance---2,000 cps., had a first-order partial r = .74, sectioning off another 16% of the variance in Q1. This hearing variable likewise related to many other variables which had significant relationships, that is, partial r's with residual Q1. Also observe the stepwise regression on each of the 16 Q's (table 2). The same theme repeats itself: multiple sources of influence are contained in each Q; the case for internal consistency of Q-factors is just not supported by the evidence.

The author has to unshackle himself from the belief that it was his responsibility to understand and interpret these clinical and gerontological entities. This requires a level of expertise that can be found mostly in a group of scientists or clinicans. It is also an enormous task to hold these many clusters in mind for any length of time, so that for this presentation, the author will trace only the following variables across the Q-factors: WAIS intelligence and selected biological (i.e, circulatory system and cerebral chemistry and metabolism variables) measures. They will be traced across the Q-factors, described, and in some instances interpreted, when the author feels competent about the meaning of the cluster.

Summary of this Q-type Factor Analysis procedure:

1. The first step was to standardize the variables across the 47 Ss.

2. In the process of generating the 47 by 47 subject R-matrix, the subject by variable matrix was automatically standard-

ized for the Ss across variables.

3. Submit the R-matrix to a factor analysis program. On the first entry of the R-matrix, the only interest was in the eigenvalues. Sixteen eigenvalues were selected on the basis of agreement between the Kaiser 1.0 and greater values and Cattell's Scree graph. On the second run, 16 unrotated principal Q-factor loadings were generated.

4. Each of these Q-factors were correlated with the 550 variables. This matrix of 550 variables by 16 Q-factors (table 1) provided correlation measures of the degree of relationships between each Q and the variables.

5. In order to better define the clinical patterns, each Q was stepwise regressed on its significantly correlating variables. (table 2). It was in this stage of the procedure that the lack of internal consistency became apparent within these Q's.

6. The stepwise sequence of variables which was generated by the stepwise regression program was submitted to a sequential partial correlation program. The purpose was to produce clear descriptions of the clusters of variables among the unentered predictors which were associated with the entering variables at each step in the regression. The same results can be less efficiently estimated from standard stepwise regression programs by attending to the sequential output from the tolerance measurements on the unentered variables. Decrements in tolerance between steps, when properly weighted across steps, provide squares of the sequential partial correlations between each entering variable in the stepwise regression and the unentered predictor variables.

7. The final step is to construct tables which will best illustrate the clusters of variables associated with each regression step. The same procedure can be used if a researcher prefers to work with a factor structure or a factor pattern matrix.

Controversy involving Q-vs. R-type factor analysis:

As pointed out, there has been considerable controversy about the Q and R factor analytic techniques. Stephenson (1936) has been the initial protagonist for Q-analysis. His proposals have been subjected to considerable criticism from prominent factor analytic experts. Broverman (1961) outlines the conflict:

"Controversy over the relationship of Q factor analysis (correlating people) to R factor analysis (correlating tests) has existed since Stephenson's introduction of Q technique in 1936. Stephenson (1936, 1952, 1953) has maintained that Q technique gives different results than R technique. Burt (1937, Esenck (1953), and others, on the other hand, have argued that the two techniques are essentially transpositions of each other, i.e., factors of visual acuity and manual dexterity obtained from an R analysis will appear as factor of visually acute and manually dextrous individuals in a Q analysis of the same data. Cattell (1952a, 1952b) while agreeing with this latter position has pointed out certain differences which make R preferable to Q technique.

This controversy reached its climax when Stephenson (1952) and Cattell (1952a) simultaneously published articules stating their respective positions. In retrospect, it seems that Cattell's position has been the more popular since over 95% of the factor analyses reported in the past seven years have employed the R technique.

Time and debate have combined to clarify and separate some of the issues. One of the issues concerns the use of Q-factor analysis for the investigations of typology; and a second relates to whether or not Q and R are mathematically two different sides of the coin.

Bolz (1972) present cogent arguments against the use of Q-analysis for typological research. The first argument refers to the improper use of Q-factor dimensions to extract typologies:

"There are, however, other reasons why it is not legitimate to factor to find people types. They can be summed up in one statement; people factors are not people types. People factors are the dimensionality of the person-space. Then the factor analytic technique cannot distinguish between two or more modes in line with origin. Thus a factor may include more than one type.

The factor can then only be interpreted as one type when actually it may be representing more than one mode...The third reason is that there may be many more modal types than there are dimensions."

The second argument against the use of Q-technique in the study of types refers to the issue of impracticality:

"There are still other reasons why factoring to locate people should be discouraged, but this involves methodological impracticalities. First, it has been demonstrated that the number of possible factors is limited by the number of people and the number of measures. Since one would desire a reasonably large sample of people so as to obtain representatives of most people types and in sufficient numbers to allow them to form a mode, a sample size of 250 would seem to be the bare minimum. One would therefore also need 250 tests or measures. There would also have to be reasonably orthogonal to avoid severe distortions of the multi-space distribution. This author, however, does not know of 250 reasonably orthogonal measures. Cattell's sixteen oblique personality factors appear to represent at least a large proportion of the battery of possible personality measures. And certainly one would not be willing to limit the sample size to sixteen individuals.

The second methodological difficulty is simply that there are problems in factoring matrices as large as 250 square matrix, though in recent years a number of these have been overcome."

With respect to the issue of uniqueness of Q vs. R, Stephenson argued about the unique qualities of the Q-technique. Ross (1963) describes Stephenson's position with some clarity:

"....Burt suggests that if our interest is in the secondary factors we decide between R and Q options on the basis of economy. Stephenson (1952; Burt and Stephenson, 1939) disagrees with Burt not so much on a point of mathematics as on a point of inferential logic which he takes to be prior and to invalidate Burt's whole mathematical argument. Stephenson's (Burt and Stephenson, 1939, p. 275) point hinges upon what he considers a difference in the aims of R and Q and upon a distinction between populations and variables. The difference Stephenson sees in aims is that, whereas R technique seeks to discover the fundamental components of a variate---to break

up its variance into communal parts---Q technique seeks to verify hypotheses about the dependence of one variable and another. Stephenson, using terms which have caused much confusion, distinguishes R as a form of interdependency analysis, and Q a form of dependency analysis. R uses testable attributes as variates and individuals as populations whereby to observe the covariation of the attributes; Q samples, on the other hand, are composed "to entail the interdependencies of the theory of issue (Stephenson, 1952, p. 486)" and those variates are used which test the dependencies."

Although Ross demonstrates mathematically how the derived factors depend upon the statistical assumptions levied upon the subject by test matrix, and thereby how R and Q factor solutions can be quite different, that is, differences in the derived factors, not only in the factor configurations, Ross does not appear particularly sympathetic to Stephenson's arguments:

> "....The point of confusion in Stephenson's presentation seems to be that the dependent effects he talks about are themselves usually dependencies, i.e., correlations or associations between variables, rather than variations in magnitude or frequency. More commonly, in experimental work, the effects would be effects of magnitude, not association."

Burt (1937, Cattell (1952a, 1952b), and Eysenck (1953) have regarded Q and R techniques as mathematical transpositions of each other. This turns out to be true only under specific conditions (Bolz, 1972). They are: 1) raw scores to be normalized and ipsatized; 2) crossproducts be used instead of correlations; and 3) unities to be placed in the diagonals; and 4) no rotation be made of the factor matrix. Initially the argument was generalized to include all sets of assumptions about the subject by tests data matrix which underlays the variety of factor analytic solutions. The generalization turned out to be unsupportable. Both Ross (1963) and Broverman (1961) had an important role in demonstrating that factor configurations and the factors themselves change as one imposes different restrictions

-on the subject by test matrix.

Cattell (1966) was quite aware of the limited application of Burt's mathematical argument about the equivalence of R and Q techniques.

"....However, since Burt's 1937 proof, it has been commonly recognized, as Horst points out above (page 143) (but perhaps with insufficient warning of the restrictions) that "one gets the same results with a latent roots and vectors solution irrespective of orientation." What is often overlooked, however, is that this simple conclusion must be watched warily, for it is hedged about with special conditions, rarely met in factor analysis, and not necessarily fitting our basic model. Notably it supposes that (1) we use unit communalities, thus accepting no specific factors and forfeiting our most likely scientific model; (2) we use a double-standardized score matrix; and (3) we use covariance or crossproduct factor analysis. Consequently it is certain that the customary practical use of R and Q technique will not yield any such simple relation between the transpose solutions...."

Cattell's preference strongly remains in terms of R technique even though he recognizes the legitimacy of the Q-technique. Under certain circumstances, the experimenter may find himself unable to apply R-analysis, and Cattell (1966) clearly elaborates the dilemma:

"In view of the difficulty of transition between transposes it is an unfortunate fact of life that the preferred R-technique approach is sometimes definitely denied to the experimenter. For example, in factoring countries for cultural pattern definition (Chapter 26) one can obtain decidedly more variables than countries. If one is to use the recommended excess of referees over relatives one must either switch to Q-technique or cut the matrix up into several small vertical oblongs, each with say, 60 more referees than relatives, and piece the separate R-technique factoring together later by one of the well known devices (229, 237)."

The following quote encompasses some of Cattell's thinking about the Q-technique (1966).

"....Q technique, therefore, can recognize no general size factor among people, since all have the same average, etc. Thus the equivalent in Q technique of Spearman's general ability factor in R technique among cognitive tests is lost for Q technique can recognize no difference of behavioral level of the human species on different test situations. If we were using physical measures, R-technique, reciprocally, would lose the "species definition" factor. For the first general factor in Q technique is a "human species"

similarity, recognizing that men are longer in the leg than the nose, etc. The person most highly loaded on it is he, or probably she, who shows the most perfect typical human form."

Broverman (1961) demonstrates that Cattell's thinking (previous quote) is in error, and the following quote from Broverman is related to tables that appear in Broverman's paper. The reader will have to refer them in order to get a feel for the correlations and the factor loadings. One can trace Broverman's arguments, however, without reference to them.

"Cattell's suggestion that this information about individual differences will be contained in the residuals of the raw score correlations after extraction of the "species" factor is incorrect, since this information, as indicated above, does not enter into the original correlations and the residuals contain only that part of the original correlations not accounted for by the first factor. Residual correlations cannot contain information not included in the original correlations.

The above argument is illustrated by the example suggested by Cattell, i.e. a table of body measurements. Table 1 presents imaginary raw data for 12 Ss on 6 body measurements: height, arm length, foot size, neck size, and body weight. A Q-analysis of these data, as shown in Table 2, results in a high positive intercorrelations of all Ss, which, inturn, produced the massive "species" factor, predicted by Cattell. This factor is so massive that it includes over 99% of the total possible communality. The residual variance, which, according to Cattell, contains the individual difference information, would normally be considered too small to warrant further consideration. However, Table 2 also shows a minute second factor which was extracted from the remaining variance in order that comparisons might be made with the first Q factor obtained after the columns of scores are standardized.

Table 3 presents the same body measurements with each column standardized to a mean 50 and a sigma of 10. Table 4 shows the first Q factor obtained from this data, which, according to Cattell, is the equivalent of the small individual differences obtained from the raw data. However, unlike that diminutive factor, the individual differences factor obtained from the standardized scores is almost as massive (it contains 80% of the total possible communality) as the first "species" factor obtained from the raw data. Examination of the factor obtained from the standardized scores reveals that it is defined equally by positively and negatively loaded Ss. If one ignores the absolute size of the second factor extracted from the raw data and simply examines the relative weights of its loadings, it is seen to be defined predominantly by positively loaded Ss.

The average of the two negative loadings is only 6% of the average of the three largest positive loadings. Thus, standardization of scores not only brings out individual differences with much greater strength, but also presents a different picture of the relationships between Ss than does a Q analysis from raw data. Clearly the Q factor obtained after standardizing colums of scores is a different factor than that obtained or obtainable from a Q analysis of the raw data."

Broverman (1961) has presented an impressive argument in contradiction of Cattell's reservation about Q-factor analysis. Although factor analysis is constructed on what would appear to mathmaticans as rather simple algebra and introductory calculus, the complexities of the hyperspaces make it quite difficult apparently to generalize from one set of conditions to all factorial conditions. Burt (1937) made that initial mistake of generalization with respect to his position of the transpositional equivalence of R and Q techniques. Cattell was aware of that problem of generalization, but likewise, because of his confidence in his understanding of factor analysis, he mistakely thought he could rationally identify the major difference between R and Q techniques. Fortunately, Cattell developed the artifical set of body measurement data upon which he demonstrated the "species" factor. Broverman, however, used the body measurement data to demonstrate the limits and errors of Cattell's thinking with respect to Q-technique. Subsequently, Ross (1963) demonstrated mathematically how the factors and the factor configurations change under various restrictions placed upon the subject by variable data matrix.

It follows from the arguments of Broverman and Ross, that preference in factor analysis is a far more complicated issue than originally conceptualized. Q-technique does not have to be applied

as a desperate after-thought to R analysis. In fact, Broverman argues that there are experimental hypotheses for which Q-analysis would be the propitious selection (1961):

> "In view of this, it is interesting to note that it is current practice in psychological research to make inferences concerning the organization of intrapsychic functioning from normative group factors. According to the arguments advanced in this paper, this practice is unwarranted and should lead to a considerably different theory of human functioning than would inferences drawn from normative personological factors. By the same token, experiental hypotheses may fail to receive empirical support if the data are not expressed in scores appropriate to the hypotheses."

It has been difficult for researchers to remain objective in this factor analytic area. Previous training, allegiances to ways of thinking, and experimental commitments combine to reinforce the status quo. The desire for normative simplicity has been a strong force. Breaking from the leadership of established experts likewise can be a difficult undertaking. The present section is filled with quotes from the experts, so that the issues can be compared on both sides and the readers can test their biases and emotional allegiances. These scientists, moreover, state their cases in greater detail than the present authors could hope to duplicate. In any event, it seems to the author that Broverman (1961) and Ross (1963) have made a contribution to the understanding factor analysis and have provided a foundation for the use of the Q-technique in empirical research.

Distance vs. non-distance measurement:

Q-type factor analysis fits into the 'non-distance" techniques. The double-centering produces subject profiles with central tendencies of zero. The factor analysis of the person correlation matrix compares similarities of subject profiles after removing quantitative

differences associated with central tendencies of the tests and the subjects. For example, the Q-analysis would regard two subject profiles as identical despite the fact that in one the unstandardized scores all lay above their respective group central tendencies; and in the other, the unstandardized scores all lay below their respective group means. The relative deviations, however, could be such that after double-standardization, these two profiles could be superimposed upon each other revealing an identical pattern.

Q-type factor analysis is concerned only with similarity of profiles. Once double-standardizing has been accomplished, one cannot retrace the differences in magnitude from the eigenvectors for they too reflect the double-standardization. Cronbach and Gleser (1953) regarded this as a very serious handicap, and therefore supported the "distance measures" in which magnitudes of the raw scores were preserved. In this situation, however, one can lump Ss together in which there is a total absence of profile similarity. To illustrate the point through a fictitious problem, the Mahalanobis $D^2 = (X_{11} - X_{12})^2 + (X_{21} - X_{22})^2$ (first subscript = variables; second subscript = subjects) could produce the same D^2 for entirely opposite reasons (i.e., $(0-0)^2 + (2-0)^2 = 4$; or $(2-0)^2 + (0-0)^2 = 4$.

I have greatly oversimplified the issues, but the idea is essentially correct. There has not been a good resolution of this measurement problem concerning similarities among Ss, and Q-type factor analysis definitely is on the profile pattern side of the issue.

It is a bothersome problem not to be able to return to the

quantitative differences among Ss in the original data. Firstly, it boggles the minds of most researchers who are trained and steeped in nomothetic thinking. Secondly, psychologists want to communicate and to think in quantitative terms. The author too talks about the Ss scoring high vs. low on the Q-factors, but this is with respect to each S's double-centered status.

In the last step of the Q-analysis, however, the author correlated the Q-factor loadings with each of the original raw scores. These r's determine the correlative relationships to the variables with the Q's. These are zero-order r's based on an N=47. Thus, the r's provide some indication of how well these double-standardized Q's have maintained their original distributions. It is only an indication that the double standardization has not completely strayed from the original orderings of Ss within the variables; however, it is at best a weak repproachment between distance vs. non-distance measures. It does suggest in this case that the data did not fall completely apart when the author moved into the ipsative mode.

Relevant Background for Present NIMH Q-type Factor Analysis:

The Q-technique has obtained the shibboleth of being a taxonomic method. It gives the appearance of being quite useful for classification purposes because it provides mathematical weighting of Ss within factors. Wittenborn and Bailey (1952) used the Q-technique to test the accuracy of psychiatric diagnosis with a group of involutional psychotics. They investigated whether the psychiatrists and the Q-technique would concur on issues of classification. They found a disparity of results, and mandated in favor

of the Q-technique based upon an argument that factors have a greater degree of internal consistency.

Although the author cannot concur with their conclusions, their work provided an interesting and useful model for using the Q-technique in clincial research. The Q-technique has failed with respect to usefulness with classification problems, but in the beginning, innovative researchers cannot necessarily anticipate that which becomes apparent retrospectively.

Cohen (1966) re-analyzed Wittenborn and Bailey's data from the standpoint of describing the factor dimensions. He attempted to identify the variables which were most influential in producing the weighting of Ss across these Q-factors. The study became much more relevant once these Q-factor dimensions were defined. There turned out to be an excellent fit between the psychiatrists and the Q-technique on the first Q-factor which focused upon paranoid involutional patients. Cohen's approach turned the Q-technique into a practical research procedure.

Kleban asked one further question: why was there diagnostic agreement on one Q-factor and disparity across the others. It is too convenient an argument to blithely attribute the disparity to unreliability of psychiatric diagnosis. The problem may reside just as well within the Q-analysis. To probe the possibilities, Kleban (1977) examined a group of diagnosed organic patients with psychiatric disturbance across 80 clinical dimensions. The question asked was: would the Q-technique be able to locate those organics with seizure problems? Expanding on Cohen's procedure, Kleban correlated each of the derived oblique Q-factors on the 80 clinical dimensions. This

redundant correlation procedure identified the relevant variables within the Q-factor dimensions.

Patients with seizure problems appeared on several Q-factors. Only one Q, however, consistently identified seizure patients. It was at this point that the whole issue of internal consistencey of Q-factors became important. Wittenborn and Bailey (1952) presumed internal consistency for their Q-factors. Kleban was now in a position to ask a very relevant question about the Q-factor dimensions. Are the Q's internally consistent, or are there many independent dimensions squeezed within a single Q-factor? The problem was answered by stepwise regressing each Q-factor on its correlated variables. A Q-factor with internal consistency would produce non-significant estimated beta coefficients for each of the unentered predictors on the first regression step, thereby expressing the singularity of influence within the factor. Instead, the typical Q-factor had many independent, statistically significant sources of competing variance. The Q which had high loadings for the seizure patients had the variable, "problems with seizures" as the strongest and thus first entering influence in the stepwise regression. The other Q's had the variable "problem with seizures" as secondary or tertiary influences in the stepwise regression on their respective Q-factors. The factor pattern weights, therefore, were reflecting the more dominant influences in each Q and could not provide accurate classification of the seizure patients. An unrotated or a rotated Q-factor matrix is constructed of layered phenomena; remove the initial source of influence, and one can observe new

predominating influences in the partialled factor matrix.

In Wittenborn and Bailey's study, the paranoid involutional psychotics were probably identified because the variable, "paranoid problems" dominated the Q-factor. Other involutional categories, such as depression, were probably in secondary, or tertiary positions in these other Q's. Cohen (1966) described these depressed patients across several Q-factors: II) relatively unsymptomatic, III) agitated depression, IV) hysterical and anxiety clusters, and V) high anxiety and depression. The primary influences are not identifiable from these R-type labels, but in each relevant factor with respect to depression one is aware of other influences (i.e., "agitation" or "anxiety"). The author would bet that "agitation" and "anxiety" had dominant influences in their factors.

The general question which arises from these statistical studies is whether factors have internal consistency. They certainly have alpha levels consistent with eigenvalues greater than 1.0, but the alpha itself presumes unidemsionality within the factor. The author asseverates that the issues of internal consistency of factors, an assumption which seems to pervade the research community, is not established by high eigenvalues. Variables (R) or Subjects (Q) with high factor loadings or weights can be present in the same factor and not represent a unity but rather independent dimensions. The entire issue of the internal consistency of factors needs review and re-evaluation by factor analytic experts.

Why has there been so much difficulty in establishing cross-validation of factor analyses? Students of this empirical catastrophe, such as Cattell, ascribe the problems to difficulties

associated with an array of improper procedures, such as, arbitrariness in selecting significant roots, the type of method employed in decomposing the correlation matrix, the method of rotation selected, the number of roots used in the rotation and differences produced by rotations established by computer algorithms which stress maximum-minimum definitions of simplicity versus Thurstone's hand rotated solution of simple structure. These arguments have been advanced by Cattell, and the author has a strong sympathy for them, because Cattell emphasizes the need for technical excellence and a degree of standardization in performing factor analyses. Although the author believes that such constraints would improve cross-validation, the author also believes that a portion of the difficulty lies within the mathematical construction of the factors themselves. One can easily determine whether a factor contains numerous independent influences. This can be observed either by a stepwise regression of Q's on its associated variables, or in the R-technique by studying the factor coefficients (factor estimation matrix). The stepwise regression of R-type factor scores on the variables will also demonstrate the multidimensional characteristics within a factor. These regressions would elucidate the images of multiple influences in the factor estimation matrix. The author has rarely observed a column of factor coefficients with only one significant coefficient. Although such factor analytic experience may result from too much exposure to gerontological data, the author would venture the guess that the same conditions permeate the other areas of multivariate study.

The present report will provide evidence of the lack of

internal consistency of Q-factors (on eigenvalues which pass both the Kaiser 1.0 and Scree graph criteria), and will provide tables on the statistical regressions used to demonstrate these difficulties. One can generate 3 to 5 practical, scientifically meaningful dimensions from each of the 16 principal Q-factors.

A second issue, which is related and extremely relevant, is: what then is the appropriate dimensionality for a rotation? Is it 16 or a larger number representing the multidimensional characteristics of a single factor? It has become second nature to want to rotate upon a reduced number of dimensions. The author seems to be suggesting a less parsimonious position. Rotations should be done on more highly defined, internally consistent dimensions, even though several of these originate from single factors.

The Principal Q-factors of the NIMH Aged Men:

Only those Q-factors are included in this report which contain information on WAIS intelligence and the designated biological indices. They will be underlined in the tables so that the readers can quickly identify these variables.

Q-factor 1:

In Q1, step 1 (table 3), WAIS Full Scale IQ was the entering variable (EV) in the stepwise regression. The WAIS subscales all participate strongly in the cluster. Biological measures from x-rays, ratings made by the radiologist, (i.e., cerebral non-vascular calcification, heart size, aortic calcification, pulmonary leisons), breathing variables, and systolic and mean arterial blood pressures were also involved in the cluster. Brighter Ss tended to be healthier and younger.

In the second step of Q1 (table 4), a variable measuring hearing capability was the EV. Hearing capability was also involved with the Q1, step 1 cluster. The latter portion of hearing capability was associated with WAIS intelligence, that is, with the brighter Ss tending to have better hearing. In this second step, hearing was unrelated to WAIS intelligence, but was strongly related to auditory reaction time, with better hearing Ss tending to make the faster responses. The related biological variables were: x-ray measures (aortic calcification, lung field calcification), maximum breathing capacity, systolic and mean arterial blood pressures, and cerebral oxygen consumption. The better hearing, faster reacting people also tended to have more favorable measurements on these biological and medical variables.

Several features of the Q-analysis can be specified; note: (1) the number of distinct, independent relationships laying within Q1; (2) the number of variables which have representation on the step 1 and step 2 dimensions; (3) how the Q-analysis distinguishes, integrates, and organizes these variables within the Q's; and (4) how these all remain clumped together and undifferentiated under the factor Q1 in the zero-order correlation matrix (table 1).

Q-factor 2:

The zero-order correlations between Q2 and its variables indicated the juxtaposition of intelligence with cerebral chemistry and metabolism measurements. As witnessed in Q1, however, these zero-order relationships (table 1) have aggluntinized at the zero-order correlation level for different reasons. Were these cerebral biological and intelligence variables actually related?

The EV in step 1 (table 5) was the psychiatrists' ratings of "lack of insight." The latter was conjoined with WAIS information, with the insightful Ss tending to be better informed. These insightful Ss, however, tended to have lower measures of cerebral oxygen consumption and higher levels of carotid artery pCO(2).

The card sorting, psychometric variables made a strong appearance in step 2. (table 6). Measures of WAIS intelligence were completely unrelated. The biological measures, however, were represented by maximum breathing capacity, carotid artery blood PH and pCO(2). Those Ss who worked more rapidly on card sorting, tended to be younger, had lower carotid artery pCO(2), had higher carotid artery PH, and a higher measure of maximum breathing capacity. This cluster contains interrelationships of visual-motor speed performance and biological functions.

In step 3, the EV was "oxygen/glucose ratio" (table 7). The cluster was essentially a glucose metabolism package, containing the latter, arterial minus venous glucose (A-V(G)), carotid and juglar blood glucose concentrations. Ss with relatively higher glucose to oxygen ratios (EV tended to use more glucose in their brain functions (i.e., larger A-V(G) differences), but had lower carotid and jugular blood glucose concentrations. Although these variables were unrelated to WAIS intelligence measurements, the cluster does contain the variable, "years of education."

In step 4 (table 8), a cluster of verbal intelligence WAIS IQ scales emerged (WAIS arithmetic was the EV). It was unrelated

to the biological variables. This aspect of WAIS intelligence is purely verbal and arithmetic in nature, slightly related to years of education, supported by other measurements of verbal and arithmetic skill, and completely distinct from WAIS performance IQ.

Q-factor 3:

The first step of Q3 (table 9) contained an integration of diastolic, systolic, mean arterial blood pressures and pulse pressures. It lays in tandem with blood O(2) content with the jugular vein. Lower O(2) content was assoicated with lower pressures. These biological variables had no relationship with WAIS intelligence but was related to faster reaction time performance and better hearing in the lower auditory ranges (125 - 1,000 cps, range).

The second step of Q3 (table 10) identified Ss with relative facility in using and recalling numeric digits. It was associated with a portion of WAIS arithemtic. It was also associated with cerebral oxygen metabolism (i.e., A-V(O(2)), and three measures of jugular venous oxygen: tension, content, and saturation). The brighter Ss tended to have lower utilization of O(2) by the brain and higher amounts of oxygen were present in the jugular vein. This may imply that the brighter Ss were more efficient metabolically in the utilization of oxygen. They seemed able to function more efficiently on smaller quantities of O(2). Their duller cohorts may have hand higher samples of oxygen in the blood because of a lessened tendency for their brain to utilize it as well.

In step 4 of Q3 (table 11), 8 PM systolic blood and 8 PM pulse pressures were integrated with the MMPI social introversion

scale. The more introverted people tended to have higher evening BP and PP levels.

Q-factor 4:

The cluster of variables in step 1 of Q4 (table 12) suggested a conglutination which related to memory function. Diotic memory had a dominant influence in the cluster and WAIS digit span, vocabulary, and picture arrangement were associated subtests. Those who were highest on the WAIS tasks tended to have the better memories. There were no biological variables in the cluster.

The fourth step of Q4 (table 13) had a WAIS vocabulary and picture arrangement influence. These seemed to be related to verbal fluency. Once again, the cluster did not show evidence of biological influences. The brighter Ss tended to be younger men.

Q-factor 5:

In step 2 (table 14), dichotic memory dominated the cluster. Those with better recall tended to have higher 8 PM pulse rates. They also produced more area of content on the Rorschach.

In step 3 (table 15), another aspect of 8 PM pulse rate emerged. Those with higher pulse rates tended to have lower measures of cerebral oxygen and cerebral glucose consumption. On the other hand, those with lower pulse rates and higher CMR(G) showed less depression and more extroversion on the MMPI.

Q-factor 6:

The first step of Q6 (table 16) was dominated by hearing ability across all cps. levels. Those with less hearing loss tended to have normal x-rays of aortic calcification and lower measures of AP diameter of the chest.

The second step (table 17) had "homonym per cent" as the EV. It was associated with diotic memory and line difference perception tasks. Those who performed better tended to have less evidence of cerebral non-vascular calcification on x-ray.

In the third step (table 18),the cerebral non-vascular calcification (x-ray) was related to MMPI measures. Ss who had higher K, Pd, and SI (those tending to be extroverted) scores did not show calicification in non-vascular portions of the brain.

Q-factor 7:

Step 1 (table 19) integrated many of the blood chemistry measures of the brain. Carotid artery pCO(2) was the EV. Those Ss who used more O(2) in the brain (i.e., A-V(O(2)), tended to have the following carotid artery blood measures: lower CO(2) content, lower CO(2) tension, higher glucose concentration, and higher PH. These people tended to have the following jugular vein blood measures: lower O(2) tension, lower CO(2) tension, lower CO(2) content, lower O(2) saturation, and higher PH. These blood chemistries were unrelated to non-biological measurements.

In step 4 of Q7 (table 20), speed of "copying words" was the EV. It was also associated with speed of doing addition and perceiving little details on the Rorschach. Those who worked more slowly when copying words, who completed less arithemtic problems, and who perceived less little details on the Rorschach tended to have an increased heart size (x-ray).

Q-factor 8:

The first step of 08 (table 21) had carotid artery blood oxygen content as the EV. It was related to a cluster of cerebral

measurements. Those with lower carotid artery blood O(2) content also manifested a lower use of O(2) by the brain (i.e., A-V(O(2)), lower arterial homoglobin concentration, higher pCO(2), higher CO(2) content, and higher jugular venous CO(2) content. These Ss tended to have lower blood hematocrit, hemoglobin, and creatinine levels. Interestingly, these same Ss had better measurements of cerebral blood flow and cerebral vascular resistence. Their blood seemed to transport more easily through their brains, but it seemed to be carrying lower levels of O(2) and higher concentrations of CO(2).

The third step of 08 (table 22) had the MMPI F scale as the EV. Those with higher F's tended to have abnormalities noted with respect to cerebral non-vascular calcification (x-ray), a history of coronary occlusion, a history of smoking, and a lower blood creatinine level.

Q-factor 9:

In step 2 of Q9 (table 23), internal jugular venous blood glucose concentration was the EV. It was joined by the carotid artery measure of blood glucose concentration. Those Ss with lower glucose measures tended to have poorer Raven Progressive Matrices scores, the latter being a non-verbal test of intelligence.

Q-Factor 10:

In step 2 of Q10 (table 24), carotid artery hemoglobin concentration was the EV. Those with higher values tended also to have higher values of blood hemoglobin and higher measures of diastolic pressure.

In step 3 (table 25), 8 AM pulse rate was the EV. Those with

higher 8 AM pulse rates tended to have higher EEG beta per cent scores.

Q-factor 11:

In step 1 of Q11 (table 26), the variable, "past history of angina pectoris" was the EV. Those with such a history tended to perform better on subtraction problems, but more slowly on visual comparison tasks (e.g., line difference comparisons). They seemed more concerned with performing well rather then fast, which was further supported by a greater depth to their responses on the Rorschach (i.e., more vista, perhaps an acknowledgement of their threatened status, and more content areas). The MMPI performance, however, indicated less anxiousness (i.e. lower MMPI Pt and Sc scores). They appeared to be more methodical and unhurried in dealing with tasks when compared to their cohorts who were not suffering from angina pectoris. Did this perspective emerge as a result of their potential life threatening condition?

Q-factor 12:

In step 2 (table 27), the variable "social initiative" was the EV. Those who took more social initiative appeared more satisfied with their daily lives, tended to do better on the WAIS digit symbol task, and gave evidence of better cerebral oxygen consumption.

Q-factor 13:

On step 3 (table 28), "oxygen-glucose ratio" was the EV. Those Ss who had relatively higher oxygen as compared to glucose also showed less utilization of glucose (A-V(G)) and lower consumption of glucose by the train. On the other hand, those who had a relatively higher use of glucose as compared to oxygen likewise manifested

a greater utilization of glucose in their brains.

Q-factor 14:

In step 1 (table 29), "electrocardiogram rating" was the EV. It had a very powerful statistical relationship with cerebral vascular calcification (x-ray). Those Ss with EKG problems also tended to have higher 8 AM pulse pressures and evidenced some attention difficulties (psychiatric examination). These Ss tended not to have had past histories of coronary occlusion.

Q-factor 16:

In the second step (table 30), "jugular venous pO(2)" was the EV. It was associated with other jugular measures: O(2) content and O(2) saturation. Lower oxygen measures, which implies greater oxygen utilization by the brain, was associated with faster speed on auditory reaction time tasks and with higher H% on the Rorschach.

Comments about the rotation of Q-factor:

The author started the Q-analysis without any clear idea of what the output would provide. The present paper represents observations and integrations of variables based on principal Q-factors of Ss. Was there any advantage of concentrating only on principal Q-factors? In this case, it was my ignorance about what they represented which lead to the excessive statistical toil with them. If additional Ss were added to the sample, particularly Ss from a less healthy group, the emerging principal Q-factors would probably have a different appearance.

Thus, this principal Q-factor output is highly sample specific. Its only possible generalization is to the same population of men. Neverthless, it provided very meaningful descriptions of these Ss.

The clusters of variables derived from their principal Q-factors appear rich in clinical meaning. It is important to repeat that generalization from this Q-analysis must be limited to the same population; comparisons to other populations should proceed by empirical rather then by inferential steps.

In R-type factor analysis, the addition of new variables to a factor analysis can indeed change the structure of the unrotated principal factors. The same difficulty was pointed out above for the unrotated principal Q-factors. In R-type analysis, a rotation can be used to seek a simple structure (hand rotation) or a simplicity solution (e.g., varimax, or any of the computerized algorithms). Although the principal factors are orthogonal, subsets of variables across factors may be correlated. The rotational procedures would tend to pull these correlated variables together into single factors. In this way, systematic tendencies across principal factors, pulled apart by their correlations with other variables in the unrotated factors, are collected and unified by the rotated solutions. The researchers, therefore, by rotating can hope to obtain a stability and repeatability for selected variables across studies with similar but differing sets of variables.

A simple structure or a simplicity solution is also possible within Q-analysis. Correlated tendencies among the Ss in the orthogonal Q-factors can be collected under these simplifying rotations. This would provide the best organized information for any sample of Ss. For example, the loading of Ss in the principal Q-factors might be such that systolic blood pressure emerged with significant

variance in several Q's. The rotational solution might simplify the information about these BPs by revealing that the same ordering of Ss across the unrotated factors were responsible each time for the significance of the systolic blood pressures? The rotation would still be a highly sample specific and related only to such a population of Ss, providing no greater advantages than the unrotated soltuion with respect to generalization to other populations of elderly poeple. Although it is the author's opinion that rotated Q's would be preferable, the rotation does not enjoy the same status that it would have in R-type factor analysis.

Recapituation of pertinent methodological issues:

1. One should not assume that factors are internally consistant. High weights or loadings on variables within a factor do not necessarily imply unidimensionality within the factor. The factor estimation matrix may tell a story of diversity and should be consulted routinely in factor analytic investigations.

2. The principal Q-factors can be statistically sectioned into many more independent, internally consistent dimensions than factors. Why stay with ill-defined dimensions, which may be quite capricious and unstable from sample to sample, and which would act only to increase the problems of cross-validation? Why not select internally consistent dimensions from the principal factors to be used for rotation purposes? This should improve cross-validation across samples. Such a proposal raises many problems, so for the time being, the author prefers to let the issue drop, especially since he has no definite plan or procedure in mind. But the author

does want to indicate that the latter represents an undeveloped alternative to traditional reductionistic procedures.

3. Cattell has not altered his position about Q-type factor analysis. To quote from his latest book (1978):

"As regard dimensions, Q-technique tells us nothing we do not know from R-technique and vice versa (with a small exception discussed below)."

The remainder of the quote slightly softens his original attitudes toward the Q-technique, suggesting that the application of R or Q depends upon the ratios of variables to subjects.

My experiences with the Q-technique has been eye-opening from both methodological and content standpoints. The author finds himself more convinced by the arguments of Broverman (1961) and Ross (1963). Although Cattell is one of the greater innovators and giants in the world factor analysis, he is simply not as well informed nor knowledgeable about the Q-technique as Broverman and Ross.

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Table

Correlations of project variables with Q-factors

Project variables	Q-factors															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Psychiatry:																
Progressive decrease of intellectual functioning	58															
Childish emotionality	50													29	28	
Blunting: unresponsiveness of emotions					52						37					
Lack of insight		54		31												
Sense of well being: excessive laughing					-41											
Relevant-incoherent	42		-32			39		-30								
Self-centered	33															
Difficulty assimilating new experiences	38											32				
Fluctuating, remitting course		-29														
Emotional lability: marked shifts of mood											28				43	
Occasional emotional incontinent: stim.-bound					-31						35					
Complaints of weakness: exhaustion	41												37			
Patchy performance	39															
Clouding of consciousness																
Confusion states																
Relevance of above positive ratings?	38	-32									-29					
Delayed relevant response			-35													
Perseveration of ideas	43				-28	30										
Impaired recent memory	66															
Impaired remote memory	33								32							
Confabulation	28															
Absorbtion in past				30												
Verbal productivity			-33		-41											-28
Agitation			-33				33									
Irritability					36											
Ability to generalize vs. concrete	68	40														
Impaired judgement	40			32								33				
Difficulty in maintaining attention	38		-39	36												
Difficulty in maintaining set	44		-37	29	-35											

(Continue Table , page 2)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Flight of ideas			-28			28		-28								
Decreased potency							33								32	
Decreased sexual desire		-39						33								
Total of preceeding variables	60		-35	32												
Retention			53							-34						
Remote memory										-35						
Orientation to time: rating											-28					
Orientation to place: rating	-47															
Orientation to person: rating																
Recent memory				-34		40										
Reading	-30									-32						
Absurdities	-47									-29			28			
Opposites	-70	-37														
Proverbs	-65	-38											28			
Information scale	-56	-47														
Comprehension scale	-53	-41														
Calculations scale	-59	-32														
Similarities scale	-67	-48														
Digit forward scale	-67															
Digit backward scale	-46		29													
Digit span scale	-64							28								
Vocabulary scale	-66	-45														
Verbal IQ scale	-67	-59														
Sum of all mental status scores	-74	-49														
Complacency 1				-44												
Complacency 2			30										40			
Complacency 3										-34						
Complacency 4																
Apathy																
Lack of Variation of affect																-40
Lack of appropriateness of affect			-30													-27
Lack of depth of affect								-28		-29						-35
Conversion symptoms						-36							33			
Hypochondriacal ideas													42			
Suspiciousness					38									32		
Persecutory trend																
Suicidal attempts													29			
Grandiose ideas		37														
Hallucinatory experience														32		
Misinterpretations						-35			-31							
Obsessions (including death)						-35										

(continue table , page 3)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Compulsions																
Phobias																
Anxiety-fear (including death)																
Nightmare-dreams				36												
Sexual maladaption-including homosexual,etc.													-30			
Psychosomatic symptoms																
Exacerbation of somatic pathology						-28										
Total-psychiatric symptom checklist													47			
Separation response-anxiety	28			39										29		
Futurity		29						-31						28		
Plans for future	29			31												
Is he----------about the future?	-51															
Does he envisage an after-life?	-45				-34							-28				
Has he made specific provisions for death?	-32									40						
Suppression of aggression						-30										
Total score			36											-30		
Fear-anxiety											-29				47	
Anger-out			40													
Anger-in								-51				40				
Depression														37		
Pleasure	32		30													
Responsiveness					-36								31			
Assertiveness	38															
Compliance-passive			32													
Compliance-active	-35					-36						-28				
Suppression								33			-29					
Unconscious repression		30				28					-43					
Use of fantasy	31			28									-30	29		
Integrating	-60		30													
Disintegrating	41		-28													
Somatic reactivity									38							
Amount																
Total score																40
Impaired recent memory	45															
Impaired intellectual function	52															
Impaired abstraction	61										-37					
Attention difficulty	49		-33											-39		
Set difficulty	46	-32	-48													
Impaired remote memory	35									36						
Impaired judgement	58		-30													
Confabulation	37												-33			
Confusion states-disorientation	35															34

(Continuation of table , page 4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Marked lability																
Total changes	71		-29													
Presence of senile quality	47		-38						34							
Index morale	-42				-42											34
Composite adaptation score	40			39	35											
Denial		43														
Passivity-activity			-29								-29					
Psychopathology-useful									32							
Psychopathology-new	31															
Psychopathology-exac.					38											
Psychological isolation	38			33	44											
Identity crisis				29		-35	-32									
Predicted functional breakdown	41															
Medical:																
Hematology:																
Hematocrit		31						-37				-42				
Hemoglobin		33						-49		36		-31				
White blood count (per cu. mm blood)													-31		33	
Differential count (% of W.B.C.)																
Polymorphonuclears				-36										29		
Lymphocytes				39												
Monocytes	-28		-38		28											
Basophiles		-33	28					34								
Eosinophiles		-32														-28
ESR (mm/hr.)				-30					-36			32				
Blood urea nitrogen (mg/ 100 cc blood)					35											
Creatinine (mg/ 100 cc serum)								-52								33
Fasting blood sugar (mg/ 100 cc blood)			30				29									
Protein-bound iodine (mg/ 100 cc serum)					39											
Total cholesterol (mg/ 100 cc serum)						-36				40			33			
Total protein (gr/ 100 cc serum)								-28	-40					34		
Albumin (gm/ 100 cc serum)	-31									30						
Globulin (gm/ 100 cc serum)			31						-43					38		
Albumin/ globulin ratio																
Electrophoresis (gm/ 100 cc serum)																
Total protein																
Albumin									37							
Alpha 1 Globulin						29										

(continuation of table , page 5)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Alpha 2 globulin									-37							
Beta 1 globulin	-40	-30								45						
Beta 2 globulin																
Gamma globulin				-29					-28	30						
Total globulin					32											
Albumin/ globulin ratio									47		29				31	
Hydrocortisone (mg free/ 100 cc plasma)								29			-32					
Urinanalysis																
Concentration (specific gravity)		32									40					
Sugar			40						28			-29	33			
Microscopic examination										-34						35
Urine 17-hydrosteroid excretion (mg/ 12 hr.)				-29			-34								-35	
Urine uropeps in excretion (units/ he. per 12 hr.)				-37										-31		
Basal metabolic rate (% of average)			28			-32										-32
Skull x-ray: vascular														-53		
Skull x-ray: non-vascular	44					-37		28								
Skull x-ray: other abnormalities											29			28		
Chest x-ray:																
Heart size	36						28									
Cardiac calcification				--28											30	
Aortic calcification	44					37										
Aortic pulsation	28															
Lung field calcification	28							28								-28
Other pulmonary lesions	38															
Diaphragmatic excursion										36		-30				
Emphysema evidence																
Electrocardiogram rating														-71		
Physical examination:																
Height						35										
Retinal arteriosclerosis			32							-35						
Hepatamegahy (cm. below costal margin)										-43						
Sublingual venoos varicosities												-28				
Increased AP diameter of chest	28			-35		39										
Angiomata of skin	30									-31				-32		
Palmer erythema																
Prostatic hypertrophy																
Palpable dorsalis pedis pulses						-35										
Varicose veins of legs																

(Continuation of table , page 6)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Neurological Examination:																
Vibration sense in feet																
Sensory loss anywhere										-28	-29			-29		
Motor function loss anywhere										28					31	
Reflex loss anywhere		-33													32	
Tremor of hands													49			
Pupillary light reflex																
Muscle tone		32		43								-45		31		
Pulmonary function:																
Total Vital Capacity (cc)	-49															
% in 1 second																
% in 3 second			35											-33	28	
Maximum breathing capacity (1/ Min.)	-43	44														
Medical History:																
Smoking history				36												
Smoking duration (years)	34		-34		28	-33		31								
Alcohol history				36				-29								
Alcohol intake duration (years)	44			29		-30										
Past history of angina pectoris						-42										
Past history of coronary occlusion								-30		-51					28	
Past history of chronic cough								35						-28		
Past history of orthopena																
Past history of mental illness												30				
Past history of mennal depression				45												
Past history of tremor of hands																
Past history of tumor																
Past history of major surgery												29				
Uses sleeping medication								35	31			33	28			
Uses laxatives	38												40	31		
Takes other medication								33								
Weight compared to average when young												-35			-29	
Blood Pressure:																
Systolic (average 8 AM)	45		52						29							
Systolic (average 8 PM)	48		48						37							
Systolic (overall average)	48		52						33							
Diastolic (average 8 AM)			50						38							
Diastolic (average 8 PM)			53						47							
Diastolic (overall average)			54						45							
Pulse pressure (average 8 AM)	50		38										-32	-34		
Pulse pressure (average 8 PM)	59		29			-29							-30			
Pulse pressure (overall average)	57		36										-33	-30		

(Continuation of table , page 7)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pulse pressure/ age (average 8 AM)	33		41										-37	-33		
Pulse pressure/ age (average 8 PM)	37		33			-31							-36			
Pulse pressure/ age (overall average)	38		39										-39	-29		
Pulse rate (average 8 AM)					-31					40						
Pulse rate (average 8 PM)					37							-44				
Pulse rate (overall average)					39					35		-35				
Temperature (P.O) (average 8 AM)		28									-32					
Temperature (P.O.) (average 8 PM)			38			28										
Temperature (P.O.) (overall average)		33														
Weight (kg) (overall average)	-29					32		-36						31		
Cerebral Chemistry and Metabolism:																
Age	43	-44														
Mean Arterial blood pressure	43		44													
Mean Jugular venoos pressure			-31									28				
Cerebral blood flow		31					-34	49							30	
Cerebral vascular resistance	32	-36					28	-35								
Arterial-venoos oxygen difference			-31				34	-47							-35	
Cerebral oxygen consumption	-37	33			-35							30				
Arterial-venoos glucose difference		-32						-41					-38			
Cerebral glucose consumption					-39								-39	29		
Cerebral R.Q.													29		-29	
Oxygen/ glucose ratio		48											37			
Internal juguàar venoos oxygen tension			31				-37								37	36
Arterial hemoglobin concentration								-49		36			30			
Arterial blood oxygen content				34				-54					32			
Internal jugular blood oxygen content			44										37			29
Arterial blood carbon dioxide content							-46	49								
Internal jugular blood cabron dioxide content							-46	37					-31			
Arterial blood glucose concentration		41					32		-32		33					
Internal jugular blood glucose concentration		46							-36		29					
Arterial blood PH		43					38									
Internal jugular blood PH		27					32									
Arterial blood carbon dioxide tension		-45					-53	28								
Internal jugular carbon dioxide tension		-34					-52									
Arterial blood oxygen saturation		-30										44				
Internal jugular blood oxygen saturation			38				-31								42	29

(Continuation of table , page 8)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Psychomatric measurement:																
Speed of copying digits	-60															
Speed of copying words	-67			31			-29	-29								
Verbal fluency: any letter (A)	-57			35	-											
Verbal fluency: S	-62			31												
Verbal fluency: N	-39			30								28				
Speed of Addition:																
1 operation	-51		32				-32					35				
2 operation	-40		35				-35									
3 operation	-31		45		-33											
6 operation	-47		53		-44		-28									
9 operation	-41		49		-39						-31					
Speed of subtraction:																
2 operation	-45		50								-46					
3 operation	-42		46								-44					
6 operation	-43		44								-38					
9 operation	-42		41								-34					
Speed of alternation:																
2 operation	-57		31								-32					
3 operation	-49		53													
6 operation	-47		47							32	-31					
9 operation	-36		46				31				-37					
Star tracing: speed of instructions	32	-32														
Star tracing: care instructions				29									-34			
Star tracing: mirror						-29					32					
Stroop:																
Read words-time			-34		35						32					
Read words-error		36					-31									
Name colors-time		-47							-31							-30
Name colors-error		-39										-37				
Name color of words-time									-28		-38					
Name color of words-error																
C/B-time		43														
C/B-error			-32												-32	
Line Difference: 2 second presentation:																
1% difference		-41						-36	-37							
2% difference		-30		38					-38							
3% difference		-42		32					-39							
5% difference		-32			-28	-33			-37		-36					
10% difference		-28		28		-38			-35		-38					
20% difference	28			26		-27			-41		-49					

(continuation of table , page 9)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Line difference: 1.5 second presentation:																
1% difference				34		-45			-32		-31					
2% difference				33		-39			-39		-34					
3% difference	29					-30			-37		-31					
5% difference	34					-41			-33		-35					
10% difference	26					-41			-52		-28					
20% difference	26					-40			-42		-48					
Reaction time: preparatory interval:																
1 second	39														32	
1.5 second	62			32												
2 second	56		30	42												
2.5 second	61			37												30
3 second	43		40	40												30
4 second	52		33	42												
5 second	53		36	43		29										
6 second	51		27	44												28
Total	63		30	43		28										
Mean	70			45												28
RT with shock at median; preparatory interval:																
1 second	45			40												28
1.5 second	66			38												28
2 second	65			28												
2.5 second	58			32												
3 second	55		38	33												
4 second	57															30
5 second	59		28	39												
6 second	61			33												
Total	66			42												
Mean	67			36												
Wechsler Adult Intelligence Scale:																
Information	-69	-46														
Comprehension	-69	-46														
Arithmetic	-68	-33	35													
Similarities	-72															
Digit Span	-46			40												
Vocabulary	-73	-30		35												
Digit Symbol	-67											32				
Picture completion	-44				33											
Block Designs	-64															
Picture Arrangement	-68			29												
Object Assembly	-41						31									

(continuation of table , page 10)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Verbal IQ	-80	-36														
Performance IQ	-68				33											
Full scale IQ	-84															
Raven Progressive Matrices	-41					32	28		-33							
Mill-Hill vocabulary (A)	-66	-33		32												
Mill-Hill vocabulary (B)										55						333
Mill-Hill vocabulary (A+B)	-70	-35		33												
Wisconsin card sorting: number of concepts	-43			35					29	-37						
Verbal learning: nonsense words:																
Number correct series 1	-66								37							
Number correct series 2	-35							30	29	-31						
Number correct series 3	-37						38								30	
Number correct series 4	-28			34			39									
Verbal learning; meaningful words	-56						31									
Tachistoscope: nonsense words	-48						46									
Tachistoscope: meaningful words	-44															
Card Sorting: complexity (C); Difficulty (D)																
C-A; D-2: time	35	-47														
C-A; D-2: error																
C-A; D-4: time	34	-46	-30													
C-A; D-4: error	37															
C-A; D-6: time	33	-49	-37													
C-A; D-6: error																
C-A; D-8: time	40	-37	-37													
C-A; D-8: error	35															
C-A; D-10: time	38	-38	-41									-32				
C-A; D-10: error																
C-B; D-4: time		-51	-41											-28		
C-B; D-4: error			-44													
C-B; D-9: time			-32				-41									
C-B; D-9: error		35														
C-C; D-4: time			-31				-41									
C-C; D-4: error																
C-C; D-9: time			-40				-45								-29	
C-C; D-9: error	32		-43			-32			-29					33		
Electroencephologram:																
Modal frequency												-29				
Slow time			-36									34				
Time alpha																
Time beta										42						
Normal-abnormal																
Time at 8 cycles								-29								

(continuation of table , page 11)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Audiometry:																
Audiogram 2,000 cps- left ear	55					43										
Audiogram 2,000 cps-right ear	69					32										
Click perception: 2,000 cps threshold	-67					-30										
Click perception: 1 cps threshold	-67															
Dichotic Memory:																
Serial score- .5 second	-31			29	34	-31										
1 second	-38			40								-30				
1.5 second				39	45										39	
2 second	-28			36	42											
Serial partial score- .5 second					42	-49	-31									
1 second				42	33			36								
1.5 second				29	44										37	
2 second					48											
Paired score- .5 second																
1 second	-39		51													
1.5 second	-45		30													
2 second	-33		29						31							
Paired partial score- .5 second	-33		29	-36					29							
1 second	-66															
1.5 second	-58		41													
2 second	-46		39					29								
Diotic memory:																
Span- .5 second	-32							32		35				-32		
Error .5 second	29			-52		-32										
Span 1 second	-41			31											-33	
Error1 second	31			-56		-34										
Span 1.5 second	-49			48		30										
Error1.5 second	44			-38												
Span 2 second	-50			42		27	37									
Error2 second	48			-41			-31									
Two click fusion		-43								32						
MMPI:																
L			-31		-39								-41			
F	57		-35													
K			-40			34							-39			
Hs + .5K	33															
D	40					46										
Hy				34				36								
Pd + .4K				30		30				-29			-28			

(continuation of table, page 12)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MF				28			-30									
PA				32							33					
Pt + K	35										36				-32	
Sc + K	35										40				-31	
Ma + .2K		36											-32			
SI			50		35											
Rorschach:																
R	-34	37					-33			-45						
W%		-41					30									
D%		41														
d%	-33						-41		29							
S%																
Sum M	-48														-42	34
Sum C					45					-28						
Sum M:C	-52				36				-28	-29						
V	-37	31									-36					
Y					35											
Sum (V + Y)	-46										-29					
Sum (M + C + V + Y)/ R	-41						35		-31							
Cards (8-10): R%																
F%	43						-32		29							
F+%													-40			35
F+% extended	-39						30									31
AT%		-28				-33										-29
Stereotyped %												32			29	
A%	40					33				37						
H%															-37	54
(A + H): (Ad + Hd)		34									-33				-29	
F% (Beck)	-49	33		-29					-37							
F%							43		-30							
Number of other contents	-47				45						-33					
Z					33									47		
N%	40															
H%	-39			-28												-35
A%		-31							28	33			28			
B%		-32		30												
D%																
F%																
M%									-30							
Sum HAB%										31						-31
AE%		-29														-35
AB%					-34			-32	34	35						

(continuation of table , page 13)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Psychological measures:																
Index level of aspiration							-36									
Performance (level of aspiration)	-51	36		29												
Weigl: color-form sorting	28															
Draw a person score	-46			30					-28							31
Performance rating to draw	49															-29
Rating (draw a person)	62			-34												
Rorschach rating	62	-34														
Stanford-Binet proverbs	75	37														
Homonyms-number	-71			37												
Homonyms-performance rating to number	67															
Homonyms-percent	-54	-35				46										
Homonyms-performance rating to percent	52	37				-43										
Sentence completion rating	36								36							30
Emotional projection test rating	53								33							
Family scene	49								28							
Problem situations	44								30							
TAT	58			-31												
Sum of ratings	78			-31												
Inflund need assessment:																
Abasement							-38								30	-31
Achievement I Intellectual												-377				
Achievement M Motor							-34									
Acquisition				-28	-29											
Affiliation				32		29										
Aggression						-28								28		
Autonomy							-28								38	
B - A				31									-29			
B - E									-37							
Cog.											-31	-28		29		30
Construct.									31							
Def.																
D - S							45									
Expos.				-28										40		
Harm - A		36												-34		
Narc.																
Nurt.												30				
Nut.								29								
Order				-28												

(continuation of table , page 14)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Passivity						-31										
Play			-35							-35				43		
Recog.								31								
Reject													-44	-28		
S - M							-29									-31
Secl.						40										
Sex									53							
Sex-adjust.									30			36				
Succor.												43			-33	
Retention								-32								
Audiometric measurement: right ear:																
Right ear conductance:																
125 cps.	55		36			28						30				
250 cps.	53		42													
500 cps.	63		34													
1,000 cps.	67		38													
1,500 cps.	71		34			37										
2,000 cps.	75					39										
3,000 cps.	68					52										
4,000 cps.	59					63										
6,000 cps.	71					33										
8,000 cps.	66					28										
Left ear conductance:																
125 cps.	49					35										
250 cps.	48					35										
500 cps.	51		34			33										
1,000 cps.	63		36			37										
1,500 cps.	65		34			42										
2,000 cps.	66					50										
3,000 cps.	47					69										
4,000 cps.	46					69										
6,000 cps.	54					52										
8,000 cps.	57					42										
Social-psychological measurement:																
Marital status	-40											-41				
Household	58											31				
Retirement	32	-35		-33					35							
Residence	45							35				39				
Social environmental supports and losses	49				35			-30					-31			

(continuation of table , page 15)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Social environmental supports and losses-expanded	49							-30					-32			
Attitudes of daily behavior	43				35			-30								
Attitudes of daily behavior-expanded	48	-31			41			-33								
ADB (organization of behavior)	-58		-41										34			
ADB (organization of behavior-expanded)	-65	31	-39													
Goal characteristics	36				34			-28						32		
Goal characteristics-expanded	35				41			-32						30		
Activity level	-28															
Activity level-expanded	-42	29														
Relationship with wife	54				32					30						
Relationship with children	41				41											
Reactions regarding grandfather role								34							-33	
Social initiative	34				51							-36				
Social field beyond household	-42	35			-36			34								
Social field beyond household-expanded	-34	35			-36			38								
Psychosocial functioning: then-time 1	54		28		44			-31								
Psychosocial functioning: now-time 3	38				46											
Foreign born vs. native	49		30			-29										
Education	-47	-37														
Income comp.: absolute terms																
Income comp.: subjective terms	-28															
Economic independence	-32												30			
Principal component analysis:																
Principal component 1	-86															
Principal component 2		-31	-35		52							-30				
Principal component 3			-38		36						33					
Principal component 4	36					51										
Principal component 5	-34			45												

Decimal points have been omitted from the correlations to conserve space.
Six variables on family history of disease have been omitted from the table because of too much missing data.

TABLE

Stepwise Multiple Regressions:
Independent Influences Within Each of the Q-factors

Reg. Steps	Predictor Variables	Entering r's at each step	Variance of Q-factor: % of step	% of Residual	Relativ %
	Q-factor 1:				
0	WAIS: Full Scale IQ	-.84	.71	1.00	.71
1	Right Ear Conductance: 2,000 cps.	.74	.54	.29	.16
2	Rorschach P% (Beck)	-.63	.40	.13	.05
3	Speed of Alternation or Themetic: 9 operation	.51	.26	.06	.02
4	Does he envisage an after-life?	-.47	.22	.06	.01
5	Reaction Time: 1.5 Sec. prep. interval	.40	.16	.05	.01
6	ADB (Organization of behavior)	-.44	.19	.04	.01
7	Line difference (1.5 Interv.): LD-20%	.39	.15	.03	.005
8	WAIS: Object Assembly	.51	.26	.03	.007
9	WAIS: Block Design	-.45	.21	.02	.004
10	Stanford-Binet (Provfabs)	.40	.16	.02	.003
				.01R*	
	Q-factor 2:				
0	Lack of insight	.54	.29	1.00	.29
1	Card Sorting (B-4): Time	-.56	.30	.71	.21
2	Oxygen-Glucose Ratio	.55	.30	.50	.15
3	WAIS: Arithmetic	-.52	.27	.35	.09
4	Rorschach W%	-.48	.23	.25	.06
5	Rorschach Rating	-.42	.17	.19	.03
6	Stanford-Binet (Provfabs)				.04
7	Rorschach B%	-.46	.21	.12	.03
8	Cerebral Blood Flow	.39	.15	.10	.02
				.08R*	

(Continuation of Table , Page 2)

Reg. Steps	Predictor Variables	Entering r's at each step	Variance of Q-factor % of step	% of Residual	Relativ %
	Q-factor 3:				
0	Diastolic Blood Pressure (overall average)	.54	.30	1.00	.30
1	Dichotic Memory: PS, 1 sec. interval	.55	.30	.71	.21
2	Retention (Psychiatry)	.49	.24	.49	.12
3	MMPI:SI	.51	.26	.37	.10
4	Speed of Subtraction: 3 operation	.50	.25	.28	.07
5	Homonyms: Rating to Performance	.51	.26	.21	.05
6	Card Sorting (C-9): Time	-.59	.25	.15	.05
7	Delayed Relevant Response	-.44	.20	..10	.02
8	EEG (% Slow Time)	-.48	.23	.08	.02
9	ADB (Organization of Behavior)	-.37	.14	.06	.01
				.05R*	
	Q-factor 4:				
0	Diotic Memory: 1 sec. interval (Span:Errors)	-.56	.32	1.00	.32
1	LD: 2 Sec. Presentation: 10% LD	.52	.27	.69	.19
2	Total Score for age relevant variables	.50	.25	.50	.12
3	WAIS: Picture Arrangement	.54	.30	.38	.11
4	Dichotic Memory: SPS, 1 Sec. Interval	.48	.23	.27	.06
5	Electrophoresis: Gamma Globulin	-.41	.17	.21	.04
6	Reaction Time: Mean Score	.47	.22	.17	.04
7	Nightmare: Dreams	.48	.23	.13	.03
8	WAIS: Digit Span	.51	.26	.10	.03
9	Arterial Blood Oxygen Content	.47	.22	.08	.02
	Q-factor 5:				
0	Blunting-Unresponsiveness	.52	.27	1.00	.27
1	Dichotic Memory: SPS, 2 Sec. Interval	.49	.24	.73	.17
2	Summary: Psycho-Social Functioning (Then-Time 1)	.50	.25	.56	.14
3	Electrophoresis: Monocytes	.42	.17	.42	.07
4	Protien-Bound Iodine	.43	.19	.35	.07
5	MMPI: L Scale	-.43	.18	.28	.05
6	WAIS: Picture Completion	.40	.16	.23	.04
7	Speed of Addition: 6 Operation	-.48	.23	.19	.04
8	Difficulty in Maintaining Set	-.53	.28	.15	.04
9	Motor Function Loss Anywhere	.42	.18	.11	.02
				.09R*	

(Continuation of Table , page 3)

Reg. Steps	Predictor Variables	Entering r's at each step	% of step	% of Residual	Relati %
	Q-factor 6:				
0	Left ear conductance, 3,000 cps.	.69	.48	1.00	.48
1	Homonymed: PE2 cent	.67	.45	.52	.23
2	MMPI: K	.47	.22	.29	.06
3	Left ear conductance, 4,000 cps.	.42	.18	.22	.04
4	Left ear conductance, 8,000 cps.	-.43	.19	.18	.03
5	Increased AP diameter of chest	.42	.17	.15	.03
6	Diotic memory (2 sec. interval: span)	.39	.15	.12	.02
7	Compliance-active (psychiatry)	-.30	.09	.10	.01
8	Recent memory (psychiatry)	.40	.16	.09	.02
9	Relevant-incoherent (psychiatry)	.31	.10	.07	.01
				.06R*	
	Q-factor 7:				
0	Arterial blood oxygen tension	-.53	.29	1.00	.29
1	Rorschach P%	.55	.30	.72	.21
2	Nonsense words (tachistoscope)	.42	.18	.50	.09
3	Speed of copying words	-.52	.28	.41	.11
4	MMPI:MF	-.47	.22	.30	.07
5	Stroop: Read words: errors	-.49	.24	.23	.06
6	Rorschach: Sum (M + C + V + Y)/R	.43	.19	.17	.03
7	Speed of addition: 6 operation	-.40	.17	.14	.02
8	Patchy performance (psychiatry)	.46	.21	.12	.03
9	Dichotic memory: Serial Paired Score - .5 sec. interval	-.37	.14	.09	.01
				.08R*	
	Q-factor 8:				
0	Arterial blood oxygen content	-.54	.30	1.00	.30
1	Anger-in (psychiatry)	-.46	.21	.71	.15
2	MMPI:F	.48	.23	.56	.12
3	MMPI:Hj	.47	.22	.43	.10
4	Social environmental supports and losses - expanded	-.50	.25	.34	.09
5	Uses laxatives	.45	.20	.25	.05
6	Alcohol history	-.41	.17	.20	.03
7	Social field beyond household - expanded	.49	.24	.17	.04
8	Electrophoresis: Basophiles	.43	.18	.13	.02
9	Goal characteristics	-.39	.15	.10	.02
				.08R*	

(Continuation of Table , Page 4)

Reg. Steps	Predictor Variables	Entering r's at each step	Variance of Q-factor % of Step	% of Residual	Relative %
	Q-factor 9:				
0	Line Difference: 1.5 Sec. interval; 10% LD	-.52	.27	1.00	.27
1	Interval Jugular, Blood Glucose Concentration	-.48	.23	.73	.17
2	TAT Ratings	.47	.22	.56	.12
3	Somatic Reactivity (Psychiatry)	.49	.24	.44	.11
4	Electrophoresis: Alpha 2 Globulin	-.43	.18	.33	.06
5	Rorschach P%	-.44	.19	.27	.05
6	Rorschach P% (Beck)	-.39	.16	.22	.03
7	Psychopathology: Useful (Psychiatry)	.38	.14	.18	.03
8	Verbal Learning (nonsense words): Series 1	.42	.18	.16	.03
9	Rorschach: Sum (M+C+V+Y)/R	-.50	.24	.13	.03
				.10R*	
	Q-factor 10:				
0	Mill-Hill Vocabulary (B)	.55	.30	1.00	.30
1	Arterial Hemoglobin Concentration	.49	.24	.70	.17
2	Pulse Rate (Average 8 A.M.)	.49	.24	.53	.13
3	Urinanalysis: Microscopic Examination	-.56	.31	.41	.13
4	Lack of Depth of Affect (Psychiatry)	-.44	.20	.28	.06
5	Electrophoresis: Gamma Globulin	.40	.16	.23	.04
6	Retinal Arteriosclerosis	-.41	.17	.19	.03
7	Rorschach: M/C Ratio	-.33	.11	.16	.02
8	Remote Memory (Psychiatry)	-.32	.10	.14	.01
9	Diastolic BP (Overall Average)	.42	.18	.13	.02
				.11 R*	
	Q-factor 11:				
0	Past History of Angina Pectoris	-.51	.26	1.00	.26
1	Impaired Abstraction (Psychiatry)	-.51	.26	.76	.19
2	Speed of Subtraction: 2 Operation	-.49	.24	.55	.14
3	Rorschach: R	-.43	.18	.42	.08
4	MMPI: Pa	.45	.20	.34	.07
5	Suppression (Psychiatry)	-.47	.22	.27	.06
6	Line Differences: 1.5 Sec. : 5% LD	-.46	.21	.21	.05
7	MMPI: Sc	.41	.17	.17	.03
8	Stroop: Name Color of Words: Time	-.39	.15	.14	.02
9	Star Tracing: Mirror	.34	.12	.12	.01
				.11 R*	

(Continuation of Table , page 5)

Reg. Steps	Predictor Variables	Entering r's at each step	% of step	% of Residual	Relativ %
	Q-factor 12:				
0	Muscle tone	-.45	.20	1.00	.20
1	Social initiative	-.50	.25	.80	.20
2	Separation response: anxiety (psychiatry)	.50	.25	.60	.15
3	Stroop: Name colors: error	-.50	.25	.45	.11
4	Arterial blood oxygen saturation	.47	.22	.34	.08
5	Past history of tumor	.33	.11	.26	.03
6	Cerebral oxygen comsumption	.35	.12	.24	.03
7	Card sorting (C-4): error	.34	.12	.21	.02
8	Electroencephalogram	.36	.13	.18	.02
9	Attitudes of daily behavior	-.36	.13	.16	.02
				.14R*	
	Q-factor 13:				
0	Tremor of hands	.49	.24	1.00	.24
1	Conversion symptoms (psychiatry)	.41	.17	.76	.13
2	Oxygen/glucose ratio	.44	.20	.63	.13
3	MMPI:Ma	-.41	.17	.51	.08
4	Hematology: white blood count	-.39	.16	.42	.07
5	Separation response: anxiety (psychiatry)	.37	.14	.36	.05
6	Pulse pressure/age ratio (average 8 AM)	-.33	.11	.31	.03
7	Internal jugular blood oxygen content	.37	.14	.28	.04
8	Rorschach: F+%	-.36	.13	.24	.03
9	Use of fantasy (psychiatry	-.46	.21	.20	.04
				.16R*	
	Q-factor 15:				
0	Fear: anxiety (psychiatry)	.47	.22	1.00	.22
1	Dichotic memory: serial store (1.5 sec. interval)	.51	.26	.78	.20
2	Emotional Lability (psychiatry	.46	.21	.58	.12
3	Verbal learning: nonsense words - Series 3	.45	.20	.46	.09
4	Arterial-venous oxygen difference	-.48	.23	.37	.05
5	Rorschach: Sum M	-.42	.18	.28	.05
6	MMPI: Pt	-.48	.23	.23	.05
7	Motor function loss anywhere	.39	.15	.18	.03
8	Card sorting (A - 8): Time	-.35	.13	.15	.02
9	Chest X-ray: Cardiac calcification	.29	.08	.13	.01
				.12R*	

(Continuation of Table , Page 6)

Reg. Steps		Entering r's at each step	Variance of Q-factor % of step	% of Residual	Relativ %
	Q-factor 14:				
0	Electrocardiogram Rating	-.71	.50	1.00	.50
1	Childish Emotionality (Psychiatry)	.39	.15	.50	.07
2	Rorschach Z	.37	.14	.42	.06
3	Cerebral Glucose Consumption	.34	.11	.36	.04
4	Body Weight	.30	.09	.32	.03
5	Uses Sleeping Medication	.33	.11	.29	.03
6	Card Sorting (B-9): Time	-.29	.08	.26	.02
7	Speed of Addition: 2 Operation	-.31	.09	.24	.02
8	Diastolic BP (Average 8 A.M.)	.34	.12	.22	.03
9	Pulse Pressure/ Age Ratio (Average 8 A.M.)	-.41	.17	.19	.03
				.16 R*	
	Q-factor 16:				
0	Rorschach H%	.54	.29	1.00	.29
1	Interval Jugular Veins Osygen Tension	.51	.26	.71	.18
2	Rorschach: AE%	-.53	.28	.53	.15
3	Draw-a-person Test Score	.46	.21	.38	.08
4	Sentence Completion Rating	.51	.26	.30	.08
5	Lack of Variation in Affect (Psychiatry)	-.36	.13	.22	.03
6	Rt-Shock at Median (1 sec. prep. interval)	.45	.20	.19	.04
7	Urinanalysis: Microscopic Examination	.31	.09	.15	.01
8	Index Morale (Psychiatry)	.31	.10	.14	.01
9	Mill-Hill Vocabulary (B)	.29	.08	.12	.01
				.11 R*	

* R - Remaining Residual Variance

Table I.1(3)

Q-factor 1: first subcluster of related variables.
Pivot variable: WAIS: Full Scale IQ

Variable	r	Scale Direction[a] Lower Q-values	Higher Q-values
Psychiatry:			
Progressive decrease in intellectual functions	.58	normal	difficulty
Childish emotionality	.50	normal	difficulty
Relevant-incoherent	.42	relevant	incoherent
Self-centered	.33	normal	difficulty
Patchy performance	.39	normal	difficulty
Perseveration of ideas	.53	normal	difficulty
Impaired recent memory	.66	normal	difficulty
Ability to generalize vs. concrete	.68	general	concrete
Orientation to place: rating	-.46	brighter	duller
Is he------about future?	-.51	optimistic	frightened
Has he made specific provisions for death?	-.32	yes	no
Assertiveness	.38	none	marked
Use of fantasy	.31	none	marked
Integrating	-.60	marked	none
Disintegrating	.41	none	marked
Impaired recent memory	.45	normal	senile impairment
Impaired intellectual functioning	.52	normal	senile impairment
Impaired abstraction	.61	normal	senile impairment
Attention difficulty	.49	normal	senile impairment
Impaired judgement	.58	normal	senile impairment
Presence of senile quality	.47	normal	senile quality
Medical and Chemical:			
Electrophoresis: beta 1 globulin	-.40	higher globulin	lower globulin
Skull X-ray: non-vascular	.44	normal	abnormal
Chest X-ray: heart size	.36	normal	abnormal
Chest X-ray: aortic calcification	.44	normal	abnormal
Chest X-ray: other pulmonary leisons	.38	normal	abnormal
Total vital capacity	-.49	higher TVC	lower TVC
Maximum breathing capacity	-.43	higher MBC	lower MBC
Smoking duration	.34	less duration	longer duration
Alcohol duration	.44	less duration	longer duration
Systolic blood pressure---average 8 AM	.48	lower pressure	higher pressure
Pulse pressure---average 8 AM	.50	lower pressure	higher pressure
Pulse pressure---average 8 PM	.59	lower pressure	higher pressure
Pulse pressure-age ratio	.37	lower pressure	higher pressure
age	.43	younger men	older men
Mean arterial blood pressure	.43	lower MABP	higher MABP
Psychometric:			
Speed of copying words	-.66	more completed	less completed
Speed of copying digits	-.60	more completed	less completed
Verbal fluency (any letter)	-.57	more completed	less completed
Speed of addition: 9 operation	-.41	more completed	less completed
Speed of subtraction: 9 operation	-.42	more completed	less completed
Speed of alternation: 9 operation	-.36	more completed	less completed

Table I.1 (continued, page 2)

Reaction time:			
1.5 second preparatory interval	.62	faster	slower
2 second preparatory interval	.56	faster	slower
2.5 second preparatory interval	.61	faster	slower
4 second preparatory interval	.52	faster	slower
Reaction time: total	.63	faster	slower
Reaction time: mean	.70	faster	slower
Reaction time: shock at median: total	.66	faster	slower
Reaction time: shock at median: mean	.67	faster	slower
Wechsler Adult Intelligence Scale:			
information	-.69	brighter	duller
comprehension	-.69	brighter	duller
similarities	-.68	brighter	duller
digit span	-.72	brighter	duller
vocabulary	-.73	brighter	duller
digit symbol	-.67	brighter	duller
picture completion	-.44	brighter	duller
block design	-.64	brighter	duller
picture arrangement	-.68	brighter	duller
object assembly	-.41	brighter	duller
verbal IQ	-.80	brighter	duller
performance IQ	-.68	brighter	duller
full scale IQ	-.84	brighter	duller
Raven Progressive Matrices	-.41	brighter	duller
Mill-Hill vocabulary (A)	-.66	brighter	duller
Wisconsin card sort	-.43	brighter	duller
Verbal learning (nonsense words)			
series 1: number correct	-.66	brighter	duller
series 2: number correct	-.35	brighter	duller
series 3: number correct	-.37	brighter	duller
series 4: number correct	-.28	brighter	duller
Verbal learning: meaningful words	-.56	brighter	duller
Tachistoscope: nonsense words	-.48	brighter	duller
Card sorting:			
complexity A; difficulty 4: errors	.37	less errors	more errors
complexity A; difficulty 10: time	.38	faster	slower
Diotic Memory tests:			
Dual channel diotic memory: 2 second span	-.50	longer span	shorter span
Dual channel diotic memory: 2 second error	.48	less errors	more errors
MMPI:			
F	.57	less deviant	more deviant
Pt + k	.35	lower scores	higher scores
Sc + k	.35	lower scores	higher scores
Rorschach:			
Sum M (human movement)	-.49	more movement	less movement
Sum M/C (human movement/ color)	-.52	more human move.	more achro. col
Sum (V + Y)	-.46	more shading	less shading
Sum (M + C + V + Y)/ R	-.41	more use determ.	less use determ
F %	.43	less form	more form
A %	.40	less A content	more A content
P % (Beck)	-.49	more populars	less populars
Number of other content	-.47	more other content	less other cont

Table I.1 (continuation, page 3)

Psychological Measures:			
Level of aspiration---performance	-.51	higher aspiration	lower aspiratio
Rorschach rating	.62	quality perceptions	poorer perceptio
Stanford-Binet proverbs	.75	quality answers	poorer answers
Emotional projection test rating	.53	quality answers	poorer answers
Sum of ratings	.78	quality answers	poorer answers
Audiometry:			
Right ear conductance:			
500 cps.	.63	less decibel loss	more decibel los
2,000 cps.	.75	less decibel loss	more decibel los
8,000 cps.	.66	less decibel loss	more decibel los
Left ear conductance:			
500 cps.	.51	less decibel loss	more decibel los
2,000 cps.	.66	less decibel loss	more decibel los
8,000 cps.	.57	less decibel loss	more decibel los
Social-Psychological Measures:			
Social environments supports and losses	.44	more signif. person	less signif. pers
Attitudes of daily behavior (organization)	-.59	more activites	less activites
Education	-.47	more education	less education

a. The descriptions of each variable represents the extremes of the scales. Many of the men have tendencies in these directions. The reader should continually remind herself or himself that these men as a whole were healthy aged people. There is pathology and related deficiencies but these tend to be mostly at incipient levels.

Table I.2(4)

Q-factor 1: second subcluster of related variables.
Pivot variable: right ear conductance: 2,000 cps.

Variable	r_{a1}	Scale Direction: Lower Q-values	Scale Direction: Higher Q-values
Psychiatry:			
Is he ----- about the future?	-.39	optimistic	frightened
Does he envisage an after-life?	-.50	yes	no
Integrating: interview	-.45	marked	none
Impaired abstraction	.41	normal	senile impairment
Index morale	-.35	higher morale	lower morale
Composite adaptation score	.48	very good	poor
Psychological isolation	.59	absent	present
Predicted functional breakdown	.52	absent	present
Medical and Chemical:			
Chest X-ray: aortic calcification	.36	normal	abnormal
Chest X-ray: lung field calcification	.39	normal	abnormal
Maximum breathing capacity	-.34	higher MBC	lower MBC
Systolic blodd pressure 8 AM (average)	.44	lower pressure	higher pressure
Systolic blood pressure 8 PM (average)	.39	lower pressure	higher pressure
Mean arterial blood pressure	.38	lower pressure	higher pressure
Cerebral oxygen consumption	-.32	higher CMRO(2)	lower CMRO(2)
Psychometrics:			
Verbal fluency (any letter)	-.34	more completed	less completed
reaction time:			
1.5 second preparatory interval	.53	faster	slower
2 second preparatory interval	.49	faster	slower
2.5 second preparatory interval	.52	faster	slower
4 second preparatory interval	.51	faster	slower
5 second preparatory interval	.60	faster	slower'
6 second preparatory interval	.57	faster	slower
Reaction time:total	.63	faster	slower
Reaction time: mean	.67	faster	slower
Reaction time: shock at median	.61	fasted	slower
Verbal learning (nonsense words) (1)	-.35	more correct	less correct
Rorschach:			
W%	.38	less W%	higher W%
Sum M	-.37	more M	less M
Psychological Measures:			
Rorschach rating	.38	better quality	poorer quality
Emotional projection test rating	.31	better quality	poorer quality
Sum of ratings	.44	better quality	poorer quality
Audiometric test:			
Right ear conductance:			
500 cps.	.61	less decibelloss	more decibelloss
2,000 cps.	.74	less decibelloss	more decibelloss
8,000 cps.	.50	less decibelloss	more decibelloss
Left ear conductance:			
500 cps.	.53	less decibelloss	more decibelloss
2,000 cps.	.58	less decibelloss	more decibelloss
8,000 cps.	.42	less decibelloss	more decibelloss
Social-Psychological Measures:			
Social environment supports and losses	.39	more sig. persons	less sig. persons
Attitudes of daily behavior (organization)	-.51	many activities	few activities
Social field beyound household	-.52	expanded field	restricted field

Table II.1 (5)

Q-factor 2: first subcluster of related variables.
Pivot variable: lack of insight

Variables	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Lack of insight	.54	normal	difficulty
Ability to generalize vs. concrete	.40	generalize	concrete
Decreased sexual desire	-.39	difficulty	normal
Grandiose ideas	.37	absent	present
Unconscious repression	.30	absent	present
Denial	.43	absent	present
Medical and Chemical:			
Electrophoresis: beta 1 globulin	-.30	higher globulin	lower globulin
Urinanalysis: specific gravity	.32	lower	higher
Reflex loss anywhere	-.33	abnormal	normal
Muscle tone	.32	poor tone	good tone
Cerebral Oxygen consumption	.33	lower CMRO(2)	higher CMRO(2)
Carbon dioxide tension (arterial)	-.45	higher pCO(2)	lower pCO(2)
Psychometric:			
WAIS: information	-.46	brighter	duller
Card sorting: complexity B; difficulty 9; errors	.35	less errors	more errors
Audiometric:			
λ-click fusion	-.43	less	more
Psychological Measurements:			
Level of aspiration: performance	.36	lower aspiration	higher aspiration
performance rating	-.35	poorer rating	better rating

Table II.2(6)

Q-factor 2: second subcluster of related variables.
Pivot variable: Card sorting: complexity B;
difficulty 4: time

Variable	r_1	Scale Direction	
		lower Q-value	Higher Q-value
Psychiatry:			
Attention difficulty	-.38	senile impairment	normal
set difficulty	-.36	senile impairment	normal
Medical and Chemical:			
Maximum breathing capacity	.36	lower MBC	higher MBC
Temperature (P.O.) (Overall average)	.31	lower measures	higher measures
Age	-.43	older people	younger people
Carotid artery blood PH	.37	lower PH	higher PH
Carotid artery carbon dioxide tension	-.36	higher pCO(2)	lower pCO(2)
Psychometrics:			
Stroop: name color: time	-.49	slower speed	faster speed
Stroop: name color: error	-.38	more errors	less errors
Line difference (2 sec. presentation)			
2% difference in lines	-.30	slower speed	faster speed
3% difference in lines	-.43	slower speed	faster speed
10% difference in lines	-.28	slower speed	faster speed
Card sorting			
complexity A; difficulty 2; time	-.44	slower speed	faster speed
complexity A; difficulty 4; time	-.41	slower speed	faster speed
complexity A; difficulty 6; time	-.49	slower speed	faster speed
complexity A; difficulty 8; time	-.33	slower speed	faster speed
complexity A; difficulty 10; time	-.34	slower speed	faster speed
complexity B; difficulty 4; time	-.56	slower speed	faster speed
complexity B; difficulty 9; time	-.37	slower speed	faster speed

a. r_1 represents first-order partial correlations.

Table II.3 (7)

Q-factor 2: third subcluster of related variables
Pivot variable: Oxygen glucose ratio

Vairables	r_2	Scale Direction	
		Lower Q-value	Higher Q-value
Medical and Chemical:			
Arterial minus venous glucose	-.48	larger differences (greater use of glucose by brain)	smaller differences
Oxygen/glucose ratio	.55	more glucose to 0(2)	more 0(2) to glucose
Arterial blood glucose concentration	.39	lower glucose level	more glucose level
Internal jugular blood glucose concentration	.49	lower glucose level	higher glucose level
Audometric:			
2-click fusion	-.40	higher delta interval	lower delta interval
Rorschach:			
D%	.46	lower D%	higher D%
P% Beck	.37	lower P%	higher P%
Education:	-.41	more education	less education

a. r_2 represents second-order partial correlations.

Table II.4 (8)

Q-factor 2: fourth subcluster of related variables.
Pivot variable: WAIS Arithmetic

Variable	r_3	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Ability to generalize vs. concrete	.39	generalize	concrete
Opposites (psychometric)	-.38	brighter	duller
Proverbs (psychometric)	-.32	brighter	duller
Psychometrics:			
Speed of alternation:			
3 operation	-.38	more completed	less completed
6 operation	-.30	more completed	less completed
9 operation	-.38	more completed	less completed
Wechsler Adult Intelligence Scales:			
information	-.44	brighter	duller
comprehension	-.45	brighter	duller
arithmetic	-.52	brighter	duller
similarities	-.31	brighter	duller
vocabulary	-.37	brighter	duller
verbal IQ	-.43	brighter	duller
Mill-Hill vocabulary (A)	-.46	brighter	duller
Psychological Measures:			
Stanford-Binet (proverbs)	.40	better quality	poorer quality
Homonyms: performance rating to per cent	.30	better quality	poorer quality
Social-Psychological Measures:			
Education	-.29	more education	less education

a. r_3 represents third-order pattial correlations.

Table III.1 (9)

Q-factor 3: first subcluster of related variables.
Pivot variable: Diastolic blood pressure (overall average)

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Total score: age related functions	.36	normal	difficulty
Medical and Chemical:			
Electrophoresis: monocytes	-.38	higher monocytes	lower monocytes
Fasting blood sugar	.30	lower sugar	higher sugar
Globulin	.31	lower globulin	higher globulin
Urin nalysis: sugar	.40	lower sugar	higher sugar
Past history: smoking duration	-.34	more years	less years
Systolic Blood pressure:			
average 8 AM	.52	lower pressure	higher pressure
average 8 PM	.48	lower pressure	higher pressure
overall average	.52	lower pressure	higher pressure
Diastolic blood pressure:			
average 8 AM	.50	lower pressure	higher pressure
average 8 PM	.53	lower pressure	higher pressure
overall average	.54	lower pressure	higher pressure
Pulse pressure:			
average 8 AM	.38	lower pressure	higher pressure
overall average	.36	lower pressure	higher pressure
Pulse pressure/ age ratio:			
average 8 AM	.41	lower pressure	higher pressure
overall average	.39	lower pressure	higher pressure
Mean arterial blood pressure	.44	lower pressure	higher pressure
Internal jugular blood O(2) content	.44	lower O(2) content	higher O(2) con
Psychometric:			
Speed of addition: 1 operation	.32	less completed	more completed
Speed of addition: 3 operation	.45	less completed	more completed
Speed of alternation: 6 operation	.47	less completed	more completed
Stroop: read words: time	-.34	slower speed	faster speed
Reaction time:			
2 second preparatory interval	.30	faster speed	slower speed
3 second preparatory interval	.37	faster speed	slower speed
4 second preparatory interval	.33	faster speed	slower speed
5 second preparatory interval	.36	faster speed	slower speed
Reaction time: total	.30	faster speed	slower speed
Reaction time: with shock at median:			
3 second preparatory interval	.38	faster speed	slower speed
5 second preparatory interval	.28	faster speed	slower speed
Card sorting: complexity B; difficulty 4:			
errors	-.44	more errors	less errors
MMPI: F	.35	lower F	more F
Audiometry:			
Right ear conductance:			
125 cps.	.36	less decibel loss	more decibel l
250 cps.	.42	less decibel loss	more decibel l
500 cps.	.34	less decibel loss	more decibel l
1,000 cps.	.38	less decibel loss	more decibel l
1,500 cps.	.34	less decibel loss	more decibel l
Left ear conductance:			
500 cps.	.34	less decible loss	more decible l

Continued (Table III.1, page 2)

1,000 cps.	.36	less decibel loss	more decibel loss
Social-Psychological Measurement:			
Activities of daily behavior (organization of behavior)	-.41	many activities	few activities

Table III.2 (10)

Q-factor 3: second subcluster of related variables.
Pivot variable: dual channel hearing

Variable	r_1	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Difficulty maintaining attention	-.47	difficulty	normal
Difficulty maintaining set	-.48	difficulty	normal
Attention difficulty	-.40	senile impairment	normal
Set difficulty	-.48	senile impairment	normal
Impaired judgement	-.29	senile impairment	normal
Total changes of senile type	-.35	senile impairment	normal
Prsence of senile quality	-.37	senile quality	absent
Medical and Chemical:			
Arterial-venous oxygen difference	-.39	bigger difference (more O(2) use)	smaller difference (less O(2) use)
Internal jugular venous O(2) tension	.30	lower pO(2)	higher pO(2)
Internal jugular veous O(2) content	.33	lower O(2) content	higher O(2) content
Internal jugular venous O(2) saturation	.40	lower saturation	higher O(2) saturat
Psychometric:			
Speed of addition:			
2 operation	.29	less completed	more completed
6 operation	.48	less completed	more completed
9 operation	.47	less completed	more completed
Speed of subtraction:			
2 operation	.43	less completed	more completed
8 operation	.42	less completed	more completed
6 operation	.39	less completed	more completed
9 operation	.43	less completed	more completed
Speed pf alternation:			
3 operation	.49	less completed	more completed
9 operation	.39	less completed	more completed
WAIS arithmetic	.33	duller	brighter
Card sorting:			
complexity B; difficulty 4: time	-.44	slower speed	faster speed
complexity B; difficulty 4: error	-.30	more errors	less errors
complexity C; difficulty 9: error	-.42	more errors	less errors
Audiometrics:			
Dual channel paired scores:			
1 second interval	.55	less recall	more recall
1.5 second interval	.28	less recall	more recall
2 second interval	.33	less recall	more recall
Dual channel partial paired scores:			
.5 second interval	.33	less recall	more recall
1.5 secndd interval	.45	less recall	more recall
2 second interval	.53	less recall	more recall

a. r_1 represents first-order partial correlations.

Table III.4 (11)

Q-factor 3: fourth subcluster of related variables.
Pivot variable: MMPI: SI

Variable	r_3	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Verbal productivity	-.32	difficulty	normal
difficulty in maintaining set	-.35	difficulty	normal
flight of ideas	-.41	difficulty	normal
anger out (interview)	.42	none	marked
Medical:			
Urinanalysis: sugar	.42	normal	abnormal
Height	-.37	taller	shorter
Systolic blood pressure:			
average 8 PM	.32	lower pressure	higher pressure
overall average	.32	lower pressure	higher pressure
Pulse pressure:			
average 8 PM	.33	lower pressure	higher pressure
overall average	.31	lower pressure	higher pressure
Pulse pressure/ age ratio:			
average 8 PM	.33	lower pressure	higher pressure
overall average	.31	lower pressure	higher pressure
MMPI:			
F	.38	lower F	higher F
K	-.44	higher K	lower K
SI	.51	extroverted	introverted
Social-Psychological Measures:			
Attitudes of daily behavior (organization of behavior)	-.39	many activities	few activities
Foreign-born vs. native	.34	native	foreign-born

a. r_3 represents third-order partial correlations.

Table IV.1 (12)

Q-factor 4: first subcluster of related variables.
Pivot variable: Dual channel: diotic span

Variable	r	Scale Direction	
		Lower Q-value	Higher Q- alue
Psychiatry:			
Psychological isolation	.33	absent	present
Psychometrics:			
Speed of copying words	.31	less completed	more completed
Wechsler Adult Intelligence Scales:			
digit span	.40	duller	brighter
vocabulary	.35	duller	brighter
picture arrangement	.29	duller	brighter
Mill-Hill vocabulary (A)	.32	duller	brighter
Wisconsin card sort	.35	less concepts	more concepts
Verbal learning (nonsense words-series 4)	.34	less learned	more learned
Audiometric tests:			
Dual channel: dichotic memory:			
serial score .5 second interval	.29	less recall	more recall
serial score 1 second interval	.40	less recall	more recall
Dual channel: diotic memory:			
.5 second interval	-.52	more errors	less errors
1 second interval	-.56	more errors	less errors
1.5 second interval	-.38	more errors	less errors
2 second interval	-.41	more errors	less errors
1 second interval (span)	.31	shorter span	longer span
1.5 second interval (span)	.48	shorter span	longer span
2 second interval (span)	.42	shorter span	longer span
Psychological Measures:			
Draw-a-person score	.30	duller	brighter
Draw-a-person rating	-.34	poorer quality	better quality
Homonyms: number	.37	duller	brighter
TAT	-.31	poorer quality	better quality
Sum of ratings	-.30	poorer quality	better quality

Table IV.4 (13)

Q-factor 4: fourth subcluster of related variables.
Pivot variable: WAIS: Picture Arrangement

Variable	r_3	Scale Direction	
		Lower Q-value	Higher Q-value
Medical:			
Reflex loss anywhere	-.34	abnormal	normal
Alcohol history	.41	mild drinkers	heavy drinkers
Age	-.37	older men	younger men
Psychometrics:			
Speed of copying words	.29	less completed	more completed
Verbal fluency (any letter)	.39	less completed	more completed
Verbal fluency (letter N)	.40	less completed	more completed
Wechsler Adult Intelligence Scale:			
Vocabulary	.40	duller	brighter
Picture Arrangement	.54	duller	brighter
Verbal IQ	.35	duller	brighter
Full scale IQ	.35	duller	brighter
Mill-Hill vocabulary (A)	.39	duller	brighter
Audiometric tests:			
Dual channel: dichotic serial score:			
1.5 second	.40	less recall	more recall
Psychological Measures:			
Level of aspiration: performance	.40	lower aspiration	higher aspiration
Level of aspiration: performance rating	-.37	poorer quality	higher quality
Homonym: number	.32	less produced	more produced
TAT	-.31	poorer quality	higher quality

a. r_3 represents third-order partial correlations.

Table V.2 (14)

Q-factor 5: second subcluster of related variables.
Pivot variable: dichotic memory: serial part score
2 second interval

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Responsiveness	-.35	marked	none
Medical:			
Electrophoresis: total globulin	.45	lower value	higher value
Pulse rate (average 8 PM)	.46	lower value	higher value
Pulse rate (overall average)	.44	lower pulse	higher pulse rate
Audiometric:			
Dichotic memory: dual channel:			
Serial score .5 second interval	.36	less recall	more recall
Serial score 1.5 second interval	.37	less recall	more recall
Serial score 2 second interval	.39	less recall	more recall
Serial part score .5 second interval	.45	less recall	more recall
Serial part score 1.5 second interval	.38	less recall	more recall
Serial part score 2 second interval	.49	less recall	more recall
Rorschach:			
Sum (M/C)	.32	more C	more M
Number of other content	.46	less content	more content

Table V.3 (15)

Q-factor 5: third subcluster of related variables.
Pivot variable: Psycho-social functioning:
Then-time 1

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Does he envisage an after-life?	-.40	Yes	No
Index morale	-.44	high morale	low morale
Psychological isolation	.32	absent	present
Medical and Chemical:			
Pulse rate (average 8 PM)	.30	lower pulse rate	higher pulse ra
Pulse rate (overall average)	.30	lower pulse rate	higher pulse re
Cerebral oxygen consumption	-.43	higher CMR(O2)	lower CMR(O2)
Cerebral glucose consumption	-.44	higher CMR(G)	lower CMR(G)
MMPI:			
D	.43	less depression	more depression
SI	.33	extraverted	introverted
Social Psychological Measures:			
Summary Psycho-social functioning:			
Then-time 1	.50		
Now-time 3	.47		

Table VI.1 (16)

Q-factor 6: first cluster of related variables.
Pivot variable: left ear conductance (3,000 cps.)

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Relevant-incoherent	.39	normal	difficulty
perseveration of ideas	.30	normal	difficulty
compliance-active	-.36	marked	none
unconscious repression	.28	none	marked
Medical:			
Chest x-ray: aortic calcification	.37	normal	abnormal
Increased AP diameter of chest	.39	lower AP	higher AP
Palpable dorsal pedis pulses	-.35	higher	lower pulse
temperature (p.o.) 8 PM average	.28	less temperature	more temperature
Psychometrics:			
Reaction time: preparatory interval:			
5 second interval	.29	faster	slower
total score	.28	faster	slower
Auditory tests:			
Click perception (2,000 cps. threshold)	-.30	higher threshold	lower threshold
Dichotic memory:			
serial score 1/2 second interval	-.31	more recall	less recall
serial part score 1/2 second interval	-.31	more recall	less recall
Right ear conductance:			
125 cps	.28	less decibelloss	more decibelloss
1,500 cps	.37	less decibelloss	more decibelloss
2,000 cps	.39	less decibelloss	more decibelloss
3,000 cps	.52	less decibelloss	more decibelloss
4,000 cps	.63	less decibelloss	more decibelloss
6,000 cps	.33	less decibelloss	more decibelloss
8,000 cps	.28	less decibelloss	more decibelloss
Left ear conductance:			
125 cps	.35	less decibelloss	more decibelloss
250 cps	.35	less decibelloss	more decibelloss
500 cps	.33	less decibelloss	more decibelloss
1,000 cps	.37	less decibelloss	more decibelloss
1,500 cps	.42	less decibelloss	more decibelloss
2,000 cps	.50	less decibelloss	more decibelloss
3,000 cps	.69	less decibelloss	more decibelloss
4,000 cps	.69	less decibelloss	more decibelloss
6,000 cps	.52	less decibelloss	more decibelloss
8,000 cps	.42	less decibelloss	more decibelloss
Rorschach:			
Anatomy per cent	-.33	more At	less At
Animal per cent	.33	less A	more A

Table VI.2 (17)

Q-factor 6: second cluster of related variables.
Pivot variable: Homonyms (per cent)

Variable	r_1	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Suppression of Aggression	-.36	difficulty	normal
Medical:			
Total cholesterol	-.44	higher	lower cholesterol
Skull x-ray: non-vascular calcification	-.49	abnormal	normal
Smoking duration	-.46	more years	less years
Alcohol duration	-.39	more years	less years
Uses sleeping medication	-.33	frequently	none
Psychometrics:			
Line difference (1.5 decond presentation):			
5% difference in lines	-.46	slower	faster
10% difference in lines	-.48	slower	faster
20% difference in lines	-.46	slower	faster
Auditory tests:			
Diotic memory:			
1/2 second interval: error	-.36	more errors	less errors
1 second interval: error	-.44	more errors	less errors
1.5 second interval: span	.46	shorter span	longer span
2 second interval: span	.48	shorter span	longer span
Psychological Measures:			
Homonyms (per cent)	.67	lower per cent	higher per cent
Homonyms (performance rating to per cent)	-.63	poorer	better
Social-Psychological Measures:			
Foreign-born vs. native	-.48	foreign-born	native

a. r_1 represents first-order partial correlations.

(to be entered under psychometric category in re-typing):

Card sorting: complexity C; difficulty 9; errors	-.35	more errors	less errors

Table VI.3 (18)

Q-factor 6: third cluster of related variables.
Pivot variable: MMPI: K

Variable	r_2	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Relevant-incoherent	.28	relevant	incoherent
perseveration of ideas	.35	normal	difficuly
Medical:			
Skull x-ray: non-vascular calcification	-.31	abnormal	normal
MMPI:			
K	.47	lower K	higher K
Pd	.28	lower Pd	higher Pd
SI	-.28	introverted	extraverted
Social Psychological Measures:			
Foreign-born vs. native	-.37	foreign-born	native

a. r_2 represents second-order partial correlations.

Table VII.1 (19)

Q-factor 7: First subcluster of related variables.
Pivot variable: Blood carbon dioxide tension (arterial)

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Agitation	.33	normal	difficulty
Medical and Chemical:			
Arterial minus venous oxygen	.34	less use of O(2) by brain	more use of O(2) by brain
Arterial (carotid artery measures);			
Blood carbon dioxide content	-.46	higher CO(2) content	Lower CO(2) conte
Blood glucose concentration	.32	lower glucose	higher glucose
Blood carbon dioxide tension	-.53	higher pCO(2)	lower pCO(2)
Blood PH	.38	lower PH	higher PH
Internal Jugular Venous blood measures:			
Carbon dioxide tension	-.52	higher pCO(2)	lower pCO(2)
Oxygen tension	-.37	higher pO(2)	lower pO(2)
Carbon dioxide content	-.46	higher CO(2) content	lower CO(2) conte
Blood PH	.32	lower PH	higher PH
Blood Oxygen saturation	-.31	higher O(2) saturation	lower O(2) saturat
Psychometrics:			
Verbal learning (nonsense words):			
Series 4	.39	less errors	more errors

Table VII.4 (20)

Q-factor 7: Pivot variable: speed of copying words

Variables	r_3	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Patchy performance	.40	normal	difficulty
Medical:			
Chest x-ray: heart size	.36	normal	abnormal
Psychometrics:			
Speed of copying words	-.52	more completed	less completed
Speed of addition:			
1 operation	-.34	more completed	less completed
2 operation	-.40	more completed	less completed
6 operation	-.45	more completed	less completed
Rorschach:			
Little d%	-.34	more d%	less d%

r_3 represents third-order partial correlations.

Table VIII.1 (21)

Q-factor 8: first subcluster of related variables.
Pivot variable: Arterial blood Oxygen content

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Suppression	.33	none	marked
Medical and Chemical:			
Hematology: hematocrit	-.37	higher level	lower level
Hematology: hemoglobin	-.49	higher level	lower level
ESR	.33	lower level	higher level
Chest x-ray: lung field calcification	.28	normal	abnormal
Cerebral blood flow	.49	poorer CBF	better CBF
Cerebral vascular resistance	-.35	more CVR	less CVR
Oxygen: arterial minus venoos difference	-.47	more O(2) use	less O(2) use
Arterial hemoglobin concentration	-.49	higher level	lower level
Arterial blood oxygen content	-.54	higher O(2)	lower O(2)
Arterial blood carbon dioxide content	.49	lower CO(2)	higher CO(2)
Arterial blood carbon dioxide tension	.28	lower pCO(2)	higher pCO(2)
Internal jugular venoos CO(2) content	.37	lower CO(2)	higher CO(2)
Creatinine	-.52	higher level	lower level
Rorschach:			
MZ	-.30	less human movement	more human movement

Table VIII.3(22)

Q-factor 8: third subcluster of related variables.
Pivot variable: MMPI: F

Variable	r_2	Scale Direction	
		Lower Q-value	Higher Q-value
Medical:			
Creatinine	-.41	higher level	lower level
Skull x-ray: non-vascular calcification	.33	normal	abnormal
Smoking duration	.30	less years	more years
Past history of coronary occlusion	.31	none	yes
Weight	-.31	heavier	lighter
Psychometric:			
Speed of copying words	-.36	more completed	less completed
MMPI:			
F	.48	lower F	Higher F

a. r_2 represents second-order partial correlations.

Table IX.2 (23)

Q-factor 9: second subcluster of related variables.
Pivot variable: internal jugular venoos blood glucose concentration

Variable	r_1	Scale Direction	
		Lower Q-value	Higher Q-value
Chemical:			
Blood glucose concentration:			
Arterial (carotid artery)	-.45	higher glucose	lower glucose
Internal jugular vein	-.48	higher glucose	lower glucose
Psychometric:			
Raven Progressive Matrices	-.47	brighter	duller

a. r_1 represents first-order partial correlations.

Table X.2 (24)

Q-factor 10: second subcluster of related variables.
Pivot variable: Arterial hemmglobin concentration

Variable	r_1	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Has he made specific provisions for death?	.29	no	yes
Medical and Chemical:			
Hematology: hemoglobin	.48	lower value	higher value
Diastolic blood pressure:			
average 8 AM	.35	lower pressure	higher pressure
average 8 PM	.49	lower pressure	higher pressure
Overall average	.44	lower pressure	higher pressure
Arterial hemoglobin concentration	.49	lower value	higher value

a. r_1 represents first-order partial correlations.

Table X.3 (25)
Q-factor 10: third subcluster of related variables..
Pivot variable: Pulse rate 8 AM)

Variable	r^2	Scale Direction	
		Lower Q-value	Higher Q-value
Medical and Chemical:			
Pulse rate 8 AM (average)	.49	Lower pulse rate	higher pulse rate
Pulse rate (overall average)	.35	lower pulse rate	higher pulse rate
Electroencephlogram:			
EEG: timbeta	.37	Lower beta %	higher beta %

a. r^2 represents second-order partial correlations.

Table XI.1(26)

Q-factor 11: first subcluster of related variables.
Pivot variable: Past history of angina pectoris

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Medical:			
Hydrocortisone	-.32	higher value	lower value
Sensory loss anywhere	-.29	abnormal	normal
Past history of angina pectoris	-.51	yes	no
Psychometrics:			
Speed of subtraction:			
2 operation	-.46	more completed	less completed
3 operation	-.44	more completed	less completed
6 operation	-.38	more completed	less completed
9 operation	-.34	more completed	less completed
Stroop: name color of words: time	-.38	slower speed	faster speed
Line difference (2 second presentation):			
5% difference in lines	-.37	slower speed	faster speed
10% difference in lines	-.38	slower speed	faster speed
20% difference in lines	-.49	slower speed	faster speed
Line difference (1.5 second presentation):			
20% difference in lines	-.48	slower speed	faster speed
MMPI:			
Pt+K	.36	lower Pt	higher Pt
Sc+K	.40	lower Sc	higher Sc
Rorschach:			
V	-.36	higher V	lower V
Number of other content	-.33	higher content	lower content

Table XII.2 (27)

Q-factor 12: second subcluster of related variables.
Pivot variable: social initiation

Variable	r_1	Scale Direction	
		Lower Q-value	Higher Q-value
Medical and Chemical:			
Past history of major surgery	.38	no	yes
Cerebral oxygen consupption	.44	poorer CMRO(2)	better CMRO(2)
Psychometrics:			
Speed of addition:			
1 operation	.39	less completed	more completed
Stroop: name colors: error	-.46	more errors	less errors
WAIS: digit symbol	.39	less completed	more completed
Card sorting:			
complexity A; difficulty 8: time	-.30	slower speed	faster speeed
complexity A; difficulty 10: time	-.37	slower speed	faster speed
Social-Psychological Measures:			
Attitudes of daily behavior	-.35	dissatisfied	satisfied
Attitudes of daily behavior-Expanded	-.39	dissatisfied	satisfied
Social initiative	-.50	lacks initiative	takes initiative

a. r_1 represents first-order partial correlations.

Table XIII.3(28)
Q-factor 13: third subcluster of related variables
Pivot variable: Oxygen-glucose ratio

Variable	r_2	Scale Direction	
		Lower Q-value	Higher Q-value
Chemical:			
Glucose (arterial-venoos difference)	-.41	more use by brain	less use by brain
Cerebral glucose consumption	-.42	higher CMR(G)	lower CMR(G)
Oxygen-glucose ratio	.45	more glucose	more oxygen
MMPI:			
L	-.40	higher L	lower L

a. r_2 represents second order partial correlations.

Table XIV.1 (29)

Q-factor 14: first subcluster of related variables.
Pivot variable: Electroeardiogram rating

Variable	r	Scale Direction	
		Lower Q-value	Higher Q-value
Psychiatry:			
Attention difficulty	-.39	senile impairment	normal
Medical:			
Urine uropeps in excretion	-.31	higher level	lower level
Skull x-ray: vascular calcification	-.54	abnormal	normal
Electrocardiogram rating	-.71	abnormal	normal
Angiomata of skin	-.32	higher level	lower level
Sensory loss anywhere	-.29	abnormal	normal
Muscle tone	.31	poor	good
Pulmonary function: % in 3 seconds	-.34	higher %	lower %
Past history of coronary occlusion	.28	no	yes
Pulse Pressure:			
average 8 AM	-.34	higher pressure	lower pressure
overall average	-.31	higher pressure	lower pressure
Rorschach:			
Z	.47	lower Z	higher Z

Table XVI.2(30)
Q-factor 16: second subcluster of related variables
Pivot variable: Oxygen tension (interval jugular vein)

Variable	r 1	Scale Direction	
		Lower Q-value	Higher Q-value
Medical and Chemical:			
Internal Jugular Venoos Blood:			
Oxygen tension	.51	lower p0(2)	higher p0(2)
Oxygen content	.35	lower 0(2) content	higher 0(2) cont
Oxygen saturation	.44	lower 0(2) saturation	higher 0(2) saturation
Psychometrics:			
Reaction time:			
2.5 second preparatory intervals	.46	faster speed	slower speed
Mean	.42	faster speed	slower speed
3 second preparatory intervals	.39	faster speed	slower speed
Reaction time: shock at median:			
1 second preparatroy intervals	.37	faster speed	slower speed
Rorschach:			
HZ	-.36	higher HZ	lower HZ